THE ENGINEERING AND MINING JOURNAL

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVI. WITH SUPPLEMENT. NO. 5.

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SUBSCRIPTION PRICE, including postage, for the United States and Canada, $4 per annum; $2.25 for six months; all other countries, including postage, $5.00 = 20s. = 25 francs = 20 marks. All payments must be made in advance.

FILE COVERS will be sent by mail for $1.25 or delivered at office for $1 each.

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THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,
P.O. Box 1833. **27 Park Place, New York.**

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DR. THOMAS M. DROWN, Secretary of the American Institute of Mining Engineers, announces that the fall meeting will be held in Troy during the second week in October. As the meeting will be devoted mainly to the reading and discussion of papers, the Secretary is making arrangements to print and circulate in advance any papers which the writers desire fully discussed, provided they are sent to him early in September.

THE closing down of the Harrison Reduction-Works, in Leadville, on account of scarcity of ore, is a significant fact, which the knowledge of the ability of the management to work as closely as local circumstances will permit makes all the more worthy of attention. The outside smelters, the Grant, Hill, Pueblo, Eilers, and Royal Gorge, are taking many of the large contracts, aggregating probably closely upon one half the output, while the six Leadville works are nearly capable of treating the entire product by themselves. Some of the heaviest producers, the Evening and Morning Star, the Iron Silver, and Silver Cord are shipping one half or one third of their output out of the camp, because the outside smelters are able to offer better terms than the local works. Utah works, too, have recently appeared as competitors.

VERY satisfactory progress has been made in our rolling-mills, steel-works, and blast-furnaces in the introduction of the best types of modern steam-engines, and we have had occasion repeatedly to note that in some of our latest silver and gold mills a spirit of true economy has prompted managers to call for similarly good work. As our mines grow deeper, and fuel in many instances becomes more expensive, it will be well for mining engineers, too, to look further than the average hoist. In many instances, the use of cut-off engines will prove economical. Automatic cut-off engines will save but little when the mines are not deep and when the hoisting is done rapidly, because the variations in the load between the full weight at the beginning and complete throttling at the end of the lift are so great in so short a space of time. Nor is it advisable to use an automatic cut-off when hoisting slowly from shallow depths; but when the weight of the hoisting-rope is not well balanced, it is best to arrange the automatic cut-off by means of a governor, because the handling of a cut-off lever is not desirable.

FOR many months, the market reports of both crude and manufactured articles have had but one story to tell: that of a constant decline in values under the pressure of a heavy production and the influence of an unparalleled timidity of buyers. In a number of trades, leading firms have succumbed, and in many others there is a feeling of doubt and uncertainty as to the future, which has led to a conservative dealing so general that business has fallen off very much, while ready money has been accumulating at such a rate at financial centers that it does not bring more than two per cent, and often less. This universal desire to retrench and to hold surplus funds in reserve for any possible emergencies has affected not only the stock exchanges, whose dealings with the outside public have dwindled away completely, in spite of many efforts to engineer a return of the old interest, but legitimate trade in all branches has also suffered. That this should be so in spite of promising crops and a fair degree of activity on the part of our railroads, is a subject over which many people are anxiously pondering, and while there is little disagreement as to the existence and extent of the evil, we have yet to hear of any plausible explanation of the causes.

THE German iron-masters have been indulging in a somewhat rambling discussion as to what measures should be taken to get their ship-builders to stop buying their iron ship plates and shapes in England and to take them from home mills. The occasion was furnished by the reading of a paper by Herr JACOBI, of Sterkrade, before the Society of German Iron-Masters, who gave the following reasons for the inability of the German works to compete with their foreign rivals. A ship-builder applying to an English firm for prices for raw material, for a ship of given tonnage and value, gets an offer to furnish it for a lump sum. A German works calls for a specification, picks out what part of the work it can do, estimates on it, and passes the rest of the work over to some other mill, so that the builder has to deal with a number of establishments instead of with one, and must go through a long process of figuring to get at the cost. Moreover, the English iron is much cheaper. This, the Germans assert, is because they do not currently make in large quantities material as poor as the plates produced in Middlesborough. They assert that if they could get Lloyd's to make special reductions for proved increase in the mechanical qualities of the raw material, and if the German railroads would put down their rates to compensate the mills for the fact that raw material for ship-building is on the free list, they could compete for the orders of the German yards. There is undoubtedly much truth in the assertion that English plates and shapes are very often of such very poor quality that many of the mysterious disappearances of vessels must be attributed to this fact; but it will take a long time before German mills can as promptly and as satisfactorily fill orders as their English rivals for the German merchant marine. The German navy is now almost exclusively supplied by the works of the country.

IN a quiet way, copper is the subject of considerable discussion in the trade, and there are many who are inclined to take a hopeful view of its future. It is argued by many that prices can not go any lower, while the likelihood is, that they will move upward. The situation is tolerably clear on this side of the Atlantic. We have shipped abroad, and are still shipping, large quantities of refined and crude copper and furnace material and ores, and have latterly begun to export largely also manufactured goods. At present prices here and abroad, this movement will continue unabated, and it may increase in volume should prices abroad harden. They are now under an artificial influence; a business firm which is well known as having been formerly an extensive speculator in tin having been holding the market for a long time. Should its movement prove successful, we may look forward to a hardening of prices here. But the trade must also face the possibility

of a failure of the speculation alluded to; and in that case, the future of our market would not be so bright. It might check our shipments, and turn into home channels considerable quantities of metal, under which the market would find it hard to rally. So far as our production goes, it is undoubtedly heavier in almost every quarter than it has been. The lake mines are in the aggregate increasing their output, and, taken all in all, the Southwest, including Arizona and New Mexico, will be ahead of last year. The Northwest, Montana principally, is developing wonderfully, but the great bulk of the material produced there goes abroad. The weakest spot in our markets, the outside brands, are now showing comparatively more strength than lake, a proof that for the present the supplies available to our refiners are not by far as heavy as they used to be. Altogether, the situation here is good; but it is imperiled by whatever may happen in England, and there the future is not so well defined as it is here.

EVIDENCE is accumulating that the Connellsville coke interests are to be consolidated in the hands of a few. The famous region has been the scene of an unparalleled development during the past few years, and its expansion of business has been the cause of a lively struggle by a number of great railroads. The Baltimore & Ohio has just appeared as a formidable rival of the Pennsylvania Railroad, and now the Vanderbilt-Gowen interest appears upon the scene, in a characteristic manner. Mr. VANDERBILT has taken the first step by building the Pittsburg, McKeesport & Youghiogheny Railroad from Pittsburg, with a branch into the coke regions, and is now at work preparing for the second one, that of securing a goodly share of the business of the region. It is stated, with much show of authority, that a syndicate has been formed embracing such men as H. C. FRICK, A. A. HUTCHINSON, with their thousands of coke-ovens, THOMAS CARNEGIE, DAVID HOSTETTER, D. A. STEWART, THOMAS MELON, and others, who, with the VANDERBILT interest, have been securing the co-operation of some coke-producers and have acquired control of the make of others. Possibly, the depression which has made so many of those interested uneasy during the past months may have obtained a share of its intensely acute character artificially, the object being to make the weak-kneed feel the blessings of submission. It is not likely that rival railroad interests will stand idly by and see their business thus pass to the control of a new-comer, and the producers of the region may have the pleasure of seeing three rich corporations bidding for their patronage. Ultimately, however, we presume the majority of the ovens might as well be branded "P.," "B. & O.," or "V."

Blast-furnace men will look upon this movement with alarm. With the Lake Superior iron ore miners holding the candle as high as the price of foreign iron, *plus* the duty and freights, will allow, and the coke-railroad alliance keeping the fuel at the highest notch which the "business will bear," their prospects of making large profits in times of prosperity, or any at all in periods of depression, are meager indeed. They should sell out to a "syndicate," and shift the burden on the rolling-mills and foundries.

ON THE SUPPOSED HUMAN FOOT-PRINTS RECENTLY FOUND IN NEVADA.

During the past summer, various accounts have been published of the discovery of human foot-prints in sandstone near Carson, Nevada, which Prof. O. C. Marsh has recently written on in the *American Journal of Science*. The locality is in the yard of the State's prison, and the tracks were uncovered in quarrying stone for building purposes. Many different kinds of tracks were found, some of which were made by an animal allied to the elephant; some resembled those of the horse and the deer; others were apparently made by a wolf. There were also tracks made by large birds.

The foot-prints occur in series, and are all nearly in the same horizon. Some of the smaller tracks are sharp and distinct, but most of the impressions are indefinite in outline, owing apparently to the fact that the exact surface on which they were made is not usually exposed.

The supposed human foot-prints are in six series, each with alternate right and left tracks. The stride is from two and a half to over three feet in extent. The individual foot-prints are from eighteen to twenty inches in length, and about eight inches wide. The distance between the line of right-hand and left-hand tracks, or the straddle, is from eighteen to nineteen inches. The size of these foot-prints, and especially the width between the right and left series, are strong evidence that they were not made by men, as has been so generally supposed. A more probable explanation is, that the impressions are the tracks of a large sloth, either *Mylodon* or *Morotherium*, remains of which have been found in essentially the same horizon. In support of this view, it may be said that the foot-prints are almost exactly what these animals would make, if the hind feet covered the impressions of those in front. In size, in stride, and in width between the right and left series of impressions, the foot-prints agree closely with what we should expect *Mylodon* or *Morotherium* to make. The geological horizon of these interesting foot-prints is near the junction of the Pliocene and Quaternary. The evidence, at present, appears to point to the Equus beds of the Upper Pliocene as the nearest equivalent. Since the above communication was read, Professor Marsh has had an opportunity of examining photographs and casts of the Carson foot-prints, and is confirmed in his opinion that the supposed human tracks were made by large Edentates. The important fact has recently been determined that some of these tracks show impressions of the fore feet. The latter are somewhat outside of the large foot-prints, as would naturally be the case, if the animal changed its course.

MINERAL PRODUCTS OF THE UNITED STATES.

A report, entitled *The Mineral Resources of the United States*, is now in press, and will shortly be published by Mr. Albert Williams, Jr., Chief of the Division of Mining Statistics and Technology, United States Geological Survey, Hon. J. W. Powell, Director. This report is for the calendar year 1882 and the first six months of 1883. It contains detailed statistics for these periods and also for preceding years, together with much technical and descriptive matter. The compilation of special statistics has been placed by Mr. Williams in the charge of leading authorities in the several branches, and the results will therefore be accepted with confidence. The following totals of the production of the more important mineral substances are from advanced proofs:

Coal.—The only statistics in which the trade is interested are those relating to the amount of coal which is mined for and reaches the market. There is, besides, a local and colliery consumption which is usually disregarded in statistics, and which ranges from 5 to 6¼ per cent on the total shipments. Of what may be called the commercial product, the quantities in 1882 were: Pennsylvania anthracite, 29,120,096 gross tons; bituminous, brown coal, lignite, and small lots of anthracite mined outside of Pennsylvania, 57,963,038 gross tons; total, 87,083,134 gross tons. The spot value of the commercial product was as follows: anthracite, $65,520,216; bituminous and other coals, $72,453,797; total, $137,974,013. During the first six months of 1883, the output was: Pennsylvania anthracite, 14,010,767 gross tons; bituminous and all other coals, 30,000,000 gross tons; total, 44,010,767 gross tons. The spot value of the commercial product during the first half of 1883 was: Pennsylvania anthracite, $31,524,226; bituminous and other coals, $37,500,000; total, $69,024,226. Including the local consumption, etc., the total product in 1882 may be stated at 92,219,454 gross tons; namely, 31,358,264 tons of Pennsylvania anthracite, and 60,861,190 gross tons of other coals; and the value at the mines was: Pennsylvania anthracite, $70,556,094; bituminous coal, etc., $76,076,487; total, $146,632,581.

Iron.—The principal iron statistics for 1882 are as follows: Pig-iron made, 4,623,323 gross tons; spot value, $106,336,429. Iron ore mined, 9,000,000 gross tons; spot value, $32,400,000. Domestic iron ore consumed, 8,700,000 gross tons; spot value, $31,320,000. Imported iron ore consumed, 589,655 gross tons. Total iron ore consumed, 9,289,655 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, $171,336,429. Anthracite consumed in all iron and steel-works, including furnaces, 3,800,000 gross tons. Bituminous coal consumed in all iron and steel-works, including furnaces, 6,600,000 gross tons. Coke consumed in all iron and steel-works, including furnaces, 3,350,000 gross tons. Charcoal consumed in all iron and steel-works, including furnaces, 107,000.000 bushels. Limestone consumed as flux, 3,850,000 gross tons; spot value, $2,310,000.

For the first six months of 1883, the totals are as follows: Pig-iron made, 2,352,019 gross tons; spot value, $47,040,380. Iron ore mined (and consumed), 4,500,000 gross tons; spot value, $12,375,000. Imported iron ore consumed, 185,000 gross tons. Total iron ore consumed, 4,685,000 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, $71,000,000. Anthracite consumed in all iron and steel-works, including furnaces, 1,810,000 gross tons. Bituminous coal consumed in all iron and steel-works, including furnaces, 3,140,000 gross tons. Coke consumed in all iron and steel-works, including furnaces, 1,780,000 gross tons. Charcoal consumed in all iron and steel-works, including furnaces, 38,750,000 bushels. Limestone consumed as flux, 1,950,000 gross tons; spot value, $1,072,500.

Gold and Silver.—The Mint authorities furnish the following statistics for 1882: Gold, $32,500,000; silver, $46,800,000; total, $79,300,000; or an increase of $1,600,000 over the output in 1881. For the first six months of 1883, the product is estimated at $16,250,000 gold, $23,400,000 silver, and $39,650,000 total; the rate of production being assumed to be the same as in 1882.

Petroleum.—The production of crude petroleum in the oil-fields of Pennsylvania and New York in 1882 was 30,053,500 barrels of 42 gallons each, worth, at an average spot value of 78⅞ cents per barrel, $23,704,698. During the first six months of 1883, the yield was 11,291,663 barrels, worth, at an average spot value of $1.00½ per barrel, $11,305,778. In addition to the quantity above stated, California produced in 1882 about 70,000 barrels.

Copper.—The production of copper in 1882 was 91,646,232 pounds, worth, at an average value of 17½ cents per pound in New York, $16,038,091. For the first half of 1883, the production is estimated at 58,000,000 pounds, worth, at an average price in New York of 14·65 cents per pound, $8,500,000. The spot value of the copper at the point of production is a matter which can not be stated with any accuracy; nor was any attempt made to ascertain the tons of copper ore mined. In 1882, 3,325,000 pounds of bluestone, worth $191,187, were made; and in the first half of 1883, the manufacture of bluestone is estimated at 1,662,500 pounds, worth $95,593.

Lead.—In 1882, 132,890 net tons of lead were produced, worth, at an average value of $95 per net ton on the Eastern seaboard, $12,624,550. For the first half of 1883, the production is estimated at 70,000 net tons, worth, at $90 per ton, $6,300,000. In this case, as with copper, it is impossible to state the average spot value of the lead, or the tons of lead ore mined. A very large proportion of the lead ore smelted is argentiferous, and is worked for its silver contents and not for the value of the lead. In the census year ended May 31st, 1880, the amount of white lead corroded was reported at 123,447,890 pounds, worth $8,770,699.

Zinc.—The production of metallic zinc in 1882 was 33,765 net tons, worth, at an average value of 5·4 cents per pound in New York, $3,646,620. The production during the first six months of 1883 is estimated at 18,000 net tons, worth, at an average value of 4⅝ cents per pound in New York, $1,665,000. In addition to the spelter and sheet-zinc made in this country, there is also a large manufacture of zinc oxide made directly from the ore. As in the case of copper and lead, it is impossible to fix an average spot value for the product, and the collection of statistics of zinc ore mined has not been attempted. In the census year 1880, the amount of zinc oxide manufactured, including that made from scrap-zinc, was reported at 20,121,761 pounds, worth $766,337.

Quicksilver.—In 1882, the production of quicksilver was 52,732 flasks (of 76½ pounds each = 4,033,998 pounds), worth, at an average price in

San Francisco of 36⅞ cents per pound, $1,487,537. During the first six months of 1883, the production was 22,740 flasks (= 1,739,610 pounds), worth, at an average price of 35½ cents per pound, $613,213. During the year 1882, 700,000 pounds of vermilion were made in the United States, having a total value of $315,000.

Nickel.—The production of pure grain nickel in 1882 was 277,034 pounds, worth, at $1.10 per pound, $304,737. There was also a production of 50 per cent copper-nickel alloy, containing 4582 pounds of nickel, worth $5040. The total nickel production was therefore 281,616 pounds, worth $309,777. The only nickel reduction-works in the United States were closed during the first half of 1883.

Cobalt.—The value of cobalt ores and matte for 1882 was about $15,000. The amount of cobalt oxide made was 11,653 pounds, worth $32,046.

Manganese.—The production of manganese ore in 1882 was 3500 gross tons, and the spot value at the mines, estimated at $15 per ton, was $52,500.

Chromium.—The production of chrome iron ore in 1882 was about 2500 net tons, worth, at an average price of $40 per ton in Baltimore, $100,000. The spot value can not be ascertained.

Tin.—A trifling amount of tin ore was mined in 1882 and the first half of 1883, and production of metallic tin began on a small scale toward the close of the latter period.

Antimony.—The production of metallic antimony, so far as ascertained, was 60 tons in 1882, worth about $12,000.

Building-Stone.—It is estimated that the value of the building-stone quarried in 1882 was $21,000,000.

Brick and Tile.—It is estimated that the total value of the brick and tile made in the United States in 1882 was $34,000,000.

Lime—There were 31,000,000 barrels (of 200 pounds each) made in 1882, having a total spot value of $21,700,000 at the kilns.

Cement.—The amount of artificial Portland cement made in 1882 was 85,000 barrels, worth, spot, $191,250. Of the cements manufactured from natural cement rock, there were 3,165,000 barrels made, worth, spot, $3,481,500. The total production of cement was 3,250,000 barrels, worth $3,672,750.

Clays.—Complete statistics of the quantity of fire and potter's clay mined in 1882 were not obtained. The value of the whiteware made was over $5,000,000.

Precious Stones.—The spot value of the precious stones found in 1882, before cutting, was between $10,000 and $15,000; after cutting, between $50,000 and $60,000.

Corundum.—It is estimated that 500 tons were mined in 1882, worth on an average only about $12.50 per ton, crude and unground; total, $6250. The value of the ground corundum manufactured during the same year was about $135,000.

Grindstones.—The value of the grindstones made from domestic rock in 1882 is estimated by leading dealers at $700,000.

Pumice-Stone.—There were 70 net tons quarried in 1882, worth about $1750.

Phosphates.—The production of washed phosphate rock in 1882 by the land mining companies of South Carolina was 191,305 gross tons; spot value, $1,147,830. By the river mining companies, 140,772 gross tons; spot value, $844,632. Total, 332,077 gross tons; spot value, $1,992,462.

Marls.—In New Jersey, 1,080,000 net tons of marl were dug in 1882. The average spot value at the pits is 50 cents per ton, making the total $540,000. There was a small yield of marls in some of the Southern States, the amount of which has not been ascertained.

Gypsum.—The most complete statistics for 1882 are those of the output of Michigan, namely, 37,821 net tons of land plaster and 135,655 barrels (of 300 pounds each) of stucco. The manufacture of plaster of Paris on the Atlantic seaboard was 525,000 barrels (of 250 pounds each), chiefly made, however, from Nova Scotia stone. Colorado produced 10,350 sacks of 100 pounds each. The production of California and some other States was not ascertained.

Salt.—The amount of salt made in 1882 was 6,412,373 barrels (of 280 pounds each = 1,795,464,440 pounds), having a spot value of $4,320,140. During the first six months of 1883, the production is estimated at 3,206,186 barrels (= 897,732,080 pounds), worth $2,160,070, the rate of production being assumed to be the same as in 1882.

Borax.—The production in 1882 was 4,236,291 pounds, having a spot value at the works of $338,903. For the first half of 1883, the output is estimated at 2,800,000 pounds, worth, spot, $224,000.

Sulphur.—Complete statistics were not obtained, The production in the census year was stated at 1,200,000 pounds, worth $21,000.

Barytes.—The amount of crude barytes mined in 1882 was 20,000 tons, worth at the point of production $160,000. The value of refined and ground barytes manufactured from the crude product above stated, was about $440,000.

Mica.—The quantity of merchantable mica mined in 1882 is estimated by leading dealers at 75,000 pounds, worth $250,000. The production is rapidly increasing.

Soapstone.—The amount quarried in 1882 is estimated at 6000 net tons, worth $90,000 at the quarries.

Quartz.—The amount of quartz mined in 1882 for glass-making and abrading purposes is estimated at 75,000 net tons.

Asbestos.—Amount mined in 1882, 1200 net tons, worth $36,000 at the point of production.

Graphite.—Amount mined in 1882, 425,000 pounds, worth, crude, at the point of production, $34,000. During the first six months of 1883, the production is estimated at 262,500 pounds, worth $21,000.

Carbonate of Soda.—Over 1,600,000 pounds were produced in 1882 from native deposits.

Asphaltum.—The production in 1882 was 3000 net tons, having a spot value of $10,500.

Alum.—No statistics. In the census year, the amount of manufactured artificial alum was reported at 39,217,725 pounds, worth $808,165.

Copperas.—The amount of copperas manufactured in 1882 is estimated at 15,000,000 pounds, worth $112,500.

The production of the following-named substances was insignificant: Apatite, arsenic, bismuth, infusorial earth, iridium, lithographic stone, nitrate of soda, ozokerite, platinum, strontia.

No reliable statistics were obtained of the following substances: Buhrstones, chalk, feldspar, fluor-spar, mineral paints, pyrites (for acid manufacture), sulphate of soda, talc (other than "soapstone").

None of the following substances is known to have been mined in 1882 or in the first half of 1883: Carbons, cryolite, rottenstone, wolfram.

Totals.—It is impossible to state the total mineral product in any form which shall not be open to just criticism. It is evident that the production statistics of such incongruous substances as iron ore, metallic gold and silver; the spot value of coal mined and the market value of metallic copper after having been transported hundreds of miles; the spot value of a crude substance like unground, unrefined barytes, and the value of a finished product like brick (in which the cost of manufacture is the leading item), such details can not well be taken as items in a general summary. The statistics have been compiled with a view to giving information on those points which are of most interest and utility, and are presented in the form usual in the several branches of trade statistics. The result is, that the values stated for the different products are necessarily taken at different stages of production or transportation, etc. Theoretically perfect statistics of mineral products would include, first of all, the actual net spot value of each substance in its crudest form, as taken from the earth; and yet for practical purposes such statistics would have little interest other than the fact that the items could be combined in a grand total in which each substance should be rated on a fairly even basis. The following groupings, therefore, are presented with a full realization of the incongruity of many of the items:

VALUES OF THE METALLIC PRODUCTS OF THE UNITED STATES IN 1882.

Pig-iron, spot value	$106,336,429
Silver, coining value	46,800,000
Gold, coining value	32,500,000
Copper, value at New York City	16,038,091
Lead, value at New York City	12,624,550
Zinc, value at New York City	3,646,620
Quicksilver, value at San Francisco	1,487,537
Nickel, value at Philadelphia	309,777
Antimony, value at San Francisco	12,000
Platinum, value at New York City	1,000
Total	$219,756,004

VALUES OF SOME OF THE NON-METALLIC PRODUCTS OF THE UNITED STATES IN 1882 (ALL SPOT VALUES, EXCEPT CHROME IRON ORE).

Bituminous coal, brown coal, lignite, and anthracite mined outside of Pennsylvania	$76,076,487
Pennsylvania anthracite	70,556,094
Crude petroleum	23,704,398
Lime	21,700,000
Building-stone	21,000,000
Salt	4,320,140
Cement	3,672,750
Limestone for iron flux	2,310,000
Phosphate rock	1,147,830
New Jersey marls	540,000
Crude borax	338,903
Mica	250,000
Crude barytes	160,000
Chrome iron ore, value at Baltimore	100,000
Soapstone	90,000
Manganese ore	82,500
Asbestos	36,000
Graphite	34,000
Sulphur	21,000
Cobalt ore and matte	15,000
Precious stones, uncut	12,500
Asphaltum	10,500
Corundum	6,250
Pumice-stone	1,750
Total	$226,156,402

RESUME OF THE VALUES OF THE METALLIC AND NON-METALLIC MINERAL SUBSTANCES PRODUCED IN THE UNITED STATES IN 1882.

Metals	$219,756,004
Mineral substances named in the foregoing table	226,156,402
	$445,912,406
Fire-clay, kaolin, potter's clay, common brick-clay, terra-cotta, limestone used as flux in copper and lead smelting, iron ore used as flux in lead smelting, pyrites (for acid-making), zinc white made directly from ore, marls (other than New Jersey), apatite, gypsum, tin ore, bismuth, arsenic, iridosmine, mill-buhrstone and stone for making grindstones, lithographic stone, talc (other than "soapstone"), quartz, feldspar, fluor-spar, terra alba, chalk, crude mineral paints, nitrate of soda, carbonate of soda, sulphate of soda, native alum, ozokerite, mineral soap strontia, etc.—certainly not less than	8,000,000
Grand total	$453,912,406

The grand total might be considerably reduced by substituting the value of the iron ore mined for that of the pig-iron made; by deducting the discount on silver; and by considering lime, salt, cement, borax, etc., as manufactures. It will also be remarked that the spot values of copper, lead, zinc, and chrome iron ore are much less than their respective values after transportation to market.

DYNAMITE STRUCK BY LIGHTNING.—The following well-authenticated case of the firing of a dynamite magazine is of interest: About a month ago, the company operating the salt mines at Avery's, or Petit Anse, Iberia Parish, La., received a large quantity of dynamite for blasting purposes. The same was stored in a magazine situated about four hundred yards from the works. Large trees were in close proximity. On Saturday, July 21st, a few minutes past twelve o'clock, a terrific storm burst on the island. Torrents of rain fell, and peal after peal of lightning rent the skies. The workmen had barely left and reached the boarding-house, situated at some distance from the works, when the lightning struck the magazine, and immediately there followed an awful explosion. For a few minutes, all seemed entirely paralyzed. Recovering, some rushed out to ascertain the cause. It was then discovered that the whole building in which was stored the explosive compound had disappeared, and in its place was left a yawning chasm fifteen or twenty feet deep by about one hundred feet in length. The trees surrounding were prostrated and shattered. One, 2½ feet in diameter, was carried by the immense power in the blast two hundred yards from where it previously stood. Every building on the island contiguous to the mines was shaken in a terrible manner, causing every glass door and window to part with its glass. The buildings containing the mills and machinery were much damaged, preventing access to the shaft for the time being. Eight box-cars, ready to be loaded, were entirely crushed in their upper part, the running gear remaining intact.

THE DIVINING-ROD.*

By Rossiter W. Raymond, Ph.D., New York City.

The extent to which the divining-rod is still used in this country for the detection of hidden treasure, mineral veins, or springs, is much greater than educated persons would be likely to suppose. For many years, wells have frequently been located by its aid in New England, where the belief is widely extended among the farmers that, in the hands of peculiarly gifted persons, this instrument possesses special virtue. Large numbers of the oil-wells of Pennsylvania have been bored at points designated by the so-called "oil-smellers." More than one adept with this instrument is practicing now in the Western mining region. I encountered, a few months ago, in Southern Colorado, a party of capitalists who were accompanied by such an expert, and whose purpose was to discover a mine, by his aid, and to buy the property thus made valuable. Still more recently, a paragraph in the Tombstone *Epitaph*, of Arizona, announced that a party of gentlemen from Chicago, whose names were given, had been scouring over the hills in the neighborhood of Tombstone, for more than a week, in company with an expert of Colorado, who had been employed to ascertain "with his well-known divining-rod" the localities of mineral wealth, and who had declared the existence of large bodies of ore in at least two places not yet developed. It is also reported, with what truth I do not know, that the Central Pacific and Southern Railroad companies have employed the divining-rod successfully in the discovery of water, and have located by this means their artesian wells in the desert. Last, but not least, a small book entitled *The Divining-Rod*, and published in Cleveland in 1876, contains an essay on this subject, read before the Civil Engineers' Club of the Northwest, at Chicago, in 1875, by Mr. Charles Latimer, a well-known engineer who has had charge of several important railroads, and who testifies in the most unqualified manner to the virtues of the divining-rod as a means of determining the position and the depth of subterranean water-courses, and claims to have discovered certain new and important laws of its operation, connecting if not identifying it with the force of electricity.

These circumstances, taken together with the fact that the "dowsers," or experts with the rod, still enjoy considerable local authority in Cornwall, and that believers in its efficacy may still be encountered among the German miners (although I think in that country the faith is more nearly extinct than elsewhere), certainly justify me in regarding this subject as one not solely of historical interest. Yet a consideration of its history and literature will throw important light upon the question, whether the phenomena which it has presented, and continues to present, are to be ranked under the head of self-delusion, deliberate deceit, or both; or, on the other hand, indicate, after all reasonable deductions for human error and credulity, a residuum of important scientific truth.

Before sketching the history of this instrument, it will be well to say a few words concerning its form, material, and use. Yet this is a work of no little difficulty. The immense literature of the divining-rod shows nothing more clearly than the boundless confusions and contradictions of its advocates and professors. Of the dozen different schools of practice, each is necessarily obliged to reject half of the asserted principles and certified facts put forward by the rest.

The most common divining-rod, perhaps, has always been a forked branch of witch-hazel in the shape of the letter Y. This wood may have been selected because it forks in such a way as to give two branches of equal size, or because of its supposed affinity for springs of water. But other woods, such as peach, ash, pitch-pine, and even metals, have been recommended at different times, and different professors of the art have also varied the shape of the rod, employing sometimes a straight twig with a small fork only at one end, or an elastic twig or whalebone without any fork. The dowsing-rod used by the expert mentioned in the Tombstone *Epitaph* is, I believe, an instrument made of two prongs of whalebone united in a stem which terminates in a case similar to a rifle cartridge. The contents of this case are a secret. (Similar cases, used in the middle ages, are said to have contained mercury.) This rod, like the ordinary forked hazel switches, is held in the two hands, each grasping the extremity of a prong, with the fingers closed not too tightly and the palms upward, the shank or stem of the rod being horizontal or vertical, or variously inclined, according to the principles of the practitioner. When carried in this manner by the operator, walking over the surface of the ground, the rod is said to turn or dip above treasure, mineral veins, springs, etc., but there is an elaborate and complicated science based upon the various degrees, directions, and force of this dipping. Unfortunately, the rules as determined by one or another celebrated operator have been found not to work for his rivals or successors, so that each authority lays down rules of its own. The straight rods were either balanced in various ways on one or both hands, or sprung bow-like between the two hands. The most peculiar rod described in ancient books was made of two pieces of wood, one of which was pointed and the other provided in the end with a socket. This rod, being delicately held, was said to indicate the presence of the object sought for by a peculiar revolution of the point in the socket.

An inquiry into the uses of such rods leads us at once to the history of our subject, in the study of which it will appear that divining-rods were first used in antiquity mainly or wholly for moral purposes; that, in the middle ages, their employment was for a long period confined to the discovery of material objects; that, toward the end of the seventeenth century, the moral use was again asserted: and that, in the eighteenth century, the divining-rod was relegated to the material sphere, and assumed the comparatively modest functions in the discharge of which it still lingers among us.

I would recommend to those who have not the means of an extended research the perusal of the book of Professor Fiske, of Harvard, on *Myths and Myth-Makers* (Boston, 1873), in the second essay of which, on *The Descent of Fire*, this subject is treated in the light of comparative mythology; also the work of Louis Figuier, *Histoire du Merveilleux dans les Temps Modernes* (Paris, 1860), half of the second volume of which is devoted to the divining-rod; and, finally, the book of Chevreul, *La Baguette Divinatoire* (Paris, 1853), which is a conclusive summary from the stand-point of modern science and experiment. I do not mention the work of Mr. Baring-Gould, *Curious Myths of the Middle Ages*, which Professor Fiske compliments with frequent quotations, for the simple reason that Mr. Baring-Gould's essay on the divining-rod is made up almost wholly of portions of Figuier's work, often translated *verbatim* and without credit. A brief, interesting, and impartial discussion of the divining-rod from the stand-point of the middle ages, together with a curious engraving illustrating its use, will be found in the well-known work of Agricola (*De Re Metallica*, Basle, 1546), published in the sixteenth century both in Latin and in German, copies of which, though not very common, are still to be met with in the antiquarian bookstores of Europe. I believe the library of the School of Mines of Columbia College contains a German copy. In the preparation of this paper, I have made use of the Latin edition, which is the only one in my possession. An excellent summary of the subject, containing many curious details, will be found also in Prof. Moritz Gaetzschmann's *Auf- und Untersuchung der Lagerstätten* (Freiberg, 1857). The Brooklyn Library contains a copy of a work entitled *Jacob's Rod: A Translation from the French of a Rare and Curious Work, A.D.* 1693, *on the Art of Finding Springs, Mines, and Minerals by Means of the Hazel Rod. To which is Appended Researches with Proofs of the Existence of a More Certain and Far Higher Faculty with Clear and Ample Instructions for Using it.* Published by the Translator: Thomas Walton, 13 Grafton street, Fitzroy Square, London. This book was published, I believe, in 1875. The title-page bears no date. The original French treatise, the translation of which occupies the first part, is probably the one entitled *La Verge de Jacob, ou l'Art de trouver les Trésors*, which Figuier (*Histoire*, etc., vol. ii., p. 257) speaks of as well-known to the adepts in occult sciences, and Chevreul (*La Baguette*, etc., p. 30) mentions as an example of the use of the term "Jacob's Rod," in those sciences, to signify a rod possessing marvelous properties. The origin of this signification will be found in Genesis 30. I suspect that neither Figuier nor Chevreul had seen this book: both of them fail to give either the name of the author or the date of publication, an omission especially noticeable in the case of Chevreul, who is usually both full and careful in his references. The translator gives the date as 1693, and names the author as M. Baritel. Of the fidelity of the translation I have no guaranty except internal evidence, from which I judge that it is honest rather than intelligent. This translator, Mr. Walton, is himself a mesmerist and electro-biologist, and declares his wife to be possessed of clairvoyant powers, of the exercise of which he believes the discovery of water, metals, etc., to be but one subdivision. The object of his translation and "addenda" is to connect the ancient phenomena of rhabdomancy, the observations and theories of Reichenbach, the fanciful speculations of Bulwer-Lytton, and numerous modern wonders (accounts of which he extracts from the *Spiritual Magazine*), and his own and his wife's alleged experience.

To the works above named I am indebted for nearly all the facts cited in this paper, and for many quotations made at second hand.

Professor Fiske, following Dr. Kuhn, whose treatise on the *Descent of Fire* was published in Berlin in 1859, traces the divining-rod to a wide-spread Aryan myth, connected with the forked lightning. Without going so far back, we may find in written history many evidences of the use of the rod, not only as a symbol of earthly power, but also as the instrument of supernatural effects, and particularly of divination. It will be remembered that the Egyptian sorcerers confronted by Moses carried rods, as Moses and Aaron also did. The prophet Hosea denounces the use of rods for divination by the Jews (Hosea 4: 2). According to another prophet (Ezekiel 21: 26), the king of Babylon consulted rods or arrows to decide his course. The Scythians, Persians, and Medes used them. Herodotus says that the Scythians detected perjurers by means of rods. The word *Rhabdomancy*, originated by the Greeks, shows that they practiced this art; and the magic power of the rods of Minerva, Circe, and Hermes or Mercury, is familiar to classical students. The *Lituus* of the Romans, with which the augurs divined, was apparently an arched rod. Cicero, who had himself been an augur, says in his treatise on divination, that he does not see how two augurs, meeting in the street, could look each other in the face without laughing. At the end of the first book of this treatise, he quotes a couplet from the old Latin poet Ennius, representing a person from whom a diviner had demanded a fee as replying to this demand. "I will pay you out of the treasures which you enable me to find." This ancient joke, by the way, has been adopted in all seriousness by the "oil-smellers" of Pennsylvania, who, as I am informed, are accustomed to locate oil-wells on precisely this condition, receiving nothing if the well proves unsuccessful, and fifty dollars if oil is struck.

Marco Polo reports the use of rods or arrows for divination throughout the Orient, and a later traveler describes it among the Turks. Tacitus says that the ancient Germans used for this purpose branches of fruit-trees. One of their tribes, the Frisians, employed rods in church to detect murderers. Finally, if we may trust Gonsalez de Mendoza, the Chinese, who seem to have had every thing before any body else, used pieces of wood for divination.

Thus we perceive that the application of the divining-rod in historical antiquity was mainly or wholly moral; that is, it was employed to detect guilt, decide future events, advise courses of action, etc., etc. There are but two passages which have been quoted to prove its use for physical purposes: one from Ctesias (*apud Phot. Bibl. Cod.*), who speaks of a rod of the wood *Parebus*, which attracted gold, silver, other metals, stones, and several other things; the other from Cicero (*De Officiis*, lib. i.), who says, "If we could obtain with the so-called divine rod every thing pertaining to food and clothing" (*ad victum cultumque*), etc.

On the other hand, the silence of many authors is significant, as Chevreul has pointed out. Varro does not mention the use of the rod for the discovery of subterranean waters or metals. Vitruvius, discussing the means of discovering springs, says nothing of it. Pliny, in Book xxx. of his Natural History, omits it from his enumeration of magical arts and methods, and in Book xxxi., describing (after Vitruvius) the means of discovering springs, and in Book xxxiii., describing explorations for metals, is equally silent concerning it. Columella, Palladius, and, in the sixth century, Cassiodorus, are likewise dumb, though the latter in one of his epistles (*Theodoric*, liii.) extols the utility of the pro-

* Read at the Boston Meeting of the American Institute of Mining Engineers.

fessional water-discoverers. Even as late as 1569, a book printed in Orleans (*L'Art et Science de trouver les Eaux et Fontaines cachées sous Terre autrement que par les Moyens vulgaires des Agriculteurs et Architectes*, par Jacques Besson, Dauphinois, mathématicien), contains no allusion to the rod. It is a curious circumstance that this work emanated from Dauphiny, the home, a century later, of the most famous diviners and water-discoverers.

But the alchemistic literature brings the physical uses of the divining-rod to the front. The first mention is usually credited to the *Novum Testamentum* of Basil Valentin, a Benedictine monk and hermeneutic philosopher of the fifteenth century. But it must be remembered that the existence, even, of this man is not beyond doubt. It is attested by Gadenus (*Historia Erfordiensis*, 1675), who says that Basil was living at the convent of St. Peter's at Erfurth in 1413. Yet the *Testamentum* was actually first printed at the beginning of the seventeenth century, though manuscript copies had been circulated earlier. Of these, Chevreul possesses one (a French translation) dated 1651, and from it quotes the famous passage according to which, at the time of the writer, the divining-rod was worn in the belt or the hat, and was used to discover metals. Basil describes seven varieties of the rod, according to its different motions.

Whatever its antiquity, the use of the rod to discover hidden treasure or metallic ore became general in Germany, and was extended thence through Flanders, England, Sweden, France, Italy, and Spain, before the end of the seventeenth century. It must be remembered that in those days the practice of burying money and plate was universal. A rod that would discover buried treasure only would, at the present time, be of comparatively little value. We know well enough where the large masses of gold and silver are piled. It is not ignorance, but bolts and bars, that prevent our getting at them; and a large class of the diviners of the middle ages would be obliged, if they lived to-day and practiced their profession, to become burglars or cashiers.

The scientific explanation of the divining-rod at this period, like the scientific explanation of nearly all facts in chemistry and physics, was "affinity," a word under which was concealed a little science together with a vast amount of ignorance and superstition. Philip Melanchthon (1497–1560), the friend of Luther, adopted this theory to explain the effects of the divining-rod. We must confess that, in an age when the attraction of the magnet for iron and of electrified amber for light bodies was known, but not understood, there was no necessary absurdity in supposing that similar phenomena might be exhibited by other classes of substances. And this natural presumption, joined with the inherent credulity of ignorance and the tendency to generalize upon imperfect data, caused a very general acceptance of the alleged operations of the divining-rod as true, and consequently the promulgation of crude quasi-scientific theories to account for it. On the other hand, it must be remembered that the belief in demoniac agencies was still active and all-pervading, so that when facts could not be scientifically explained, they were at once referred to witchcraft or to the devil directly. So long as the discussion remained within the field of science, it was conducted with courage and candor; but when it entered the demoniac domain, the boldest philosopher, unless he were willing to sell his soul to Satan, became dumb. This may explain the attitude of the great Agricola (*De Re Metallica*, lib. ii.) a keen observer and wise reasoner, who, after saying that the alleged virtues of the divining-rod are subject to much dispute, and stating both sides of the dispute with admirable clearness, demolishes in a few words the supposed analogies of magnetism and electricity, but declares that, if the divining-rod derives any power from spells and incantations, that is a matter neither permissible nor agreeable for him to discuss. He proceeds, moreover, to assert, as the general result of experience in his time, that the professors of the divining-rod, though they sometimes succeed in discovering veins, quite as frequently fail, and have to dig like other people if they wish to find any thing. Wherefore, he advises the respectable and sober miner to study the indications of nature, and then dig at once, without further fooling. In a quaint woodcut which accompanies this passage, a miner is represented in the background as cutting his hazel twig; while another in the foreground is proceeding with it in due form for the discovery of the mine; and (whether in sarcasm or not, I do not undertake to say) at the very point to which the latter is steering, two of Agricola's "good and sober" miners have already found ore by the homely process of digging.

Paracelsus (1495–1541) condemns in his works, as uncertain, illusory, and unlawful, the use of the rod. His disciples did not uniformly agree with this view. Goclenius, author of *Essays on the Virtue of Plants and the Unguent of Arms*, believes in the efficacy of the rod, and does not condemn its use. Libavius, author of the *Syntagma Arcanorum Chimicorum* (died 1616) believed in it from experience, and explains its action by sympathetic affinity. This theory, already announced by Melanchthon, was also held by his son-in-law Peucer, by Porta (*Magia Naturalis*, 1569, lib. xx., cap. viii.), by Keckermann (1573–1609, *Systemata Physica*, lib. i., cap. viii.), by the author of one of the discourses published with those of Maiolus, Bishop of Volturara (1614), and by Michael Mayer, the prolific author of alchemistic allegory (*Verum inventum, hoc est Munera Germaniæ*, cap. iv.), who, describing the invention of gunpowder in Germany and the use of hazel-charcoal in its original manufacture, mentions the sympathy which hazel-wood has for metals, and its consequent employment in the form of the divining-rod.

On the other hand, the Jesuit father Laurentius Forer (*Viridarium Philosophicum seu Disputationes de Selectis in Philosophiâ Materiis*, 1624) condemns the use of the rod as a superstitious practice. We must distinguish therefore three different views of the question: two of which accepted the efficacy of the rod as proved, and ascribed it respectively to a physical property of the rod, and to demoniac agency, while the third discredited the alleged facts, and pronounced the practice to be a superstition.

A fourth view was indeed advanced, according to which the operator, as well as the rod, was the recipient of a divinely-given faculty. It was no doubt with the purpose of shielding the odium attached to dealings with the Evil One that the professors of this science, particularly in Germany, surrounded it with ceremonies and formulas of a highly pious character. It is true that the rules sometimes prescribed for the cutting of the twig partook largely of heathen sorcery and astrology. They were indeed, to some extent, unconscious reminiscences of the old Scandinavian, and even of the Aryan, mythology. But this was atoned for when the rod was duly Christianized by baptism, being laid for this purpose in the bed with a newly baptized child, by whose Christian name it was afterward addressed. The following formula, cited by Gaetzschmann, may serve as an example: "In the name of the Father, and of the Son, and of the Holy Ghost, I adjure thee, Augusta Carolina, that thou tell me, so pure and true as Mary the Virgin was, who bore our Lord Jesus Christ, how many fathoms is it from here to the ore?" In this case, the rod was expected to reply by dipping a certain number of times, corresponding to the number of fathoms.

Such devices, however, were not everywhere successful in diverting from the practitioners of this occult science the evil name of sorcery. A striking and pathetic instance is furnished in the seventeenth century by the history of the Baron and Baroness Beausoleil. The baron, born in Brabant, devoted himself to mineralogy and mining, and became, undoubtedly, one of the foremost mine-engineers of his time. He visited and studied the mines of Germany, Hungary, Bohemia, Tyrol, Silesia, Moravia, Poland, Sweden, Italy, Spain, Scotland, England, and France. The emperors Rudolph and Matthias appointed him counselor and commissary-general of the mines of Hungary. The Archduke Leopold made him director of the mines of Tyrol and Trent. The dukes of Bavaria, Neuburg, and Cleves gave him the same title. Finally, the pope did the same for all the papal states. He appears to have amassed from these various employments a considerable fortune.

In 1600, he was engaged by the comptroller-general of the mines of France to open mines in Languedoc and some other provinces, and in 1626 this commission was still further extended. During this period, he met and married his wife, who devoted herself with enthusiasm to his profession, studying and traveling extensively with him in Germany, Italy, Sweden, and perhaps Spain. They even made a voyage to the shores of the new world. In 1627, their house was robbed under the legal forms of search on the charge of sorcery preferred by a local official. Their loss was estimated at one hundred thousand crowns. They easily obtained acquittal of the charge; but it is an instructive commentary on the justice of the time that they never were able to recover their property. They went to Hungary, but returned to France in 1632 under a new commission from Louis XIII. In this year, the baroness, who was an accomplished author, published an account of one hundred and fifty mines already discovered in France, and of some medicinal springs. They expended, in further explorations, nearly the whole of their fortune; but were unable, in the face of their jealous rivals and enemies, to obtain from the government the grants which had been promised them, and by means of which they expected to reimburse themselves. Finally, the baroness published a work, addressed to Richelieu, and entitled *The Restitution of Pluto* (reprinted at Paris in 1779), in which, with eloquent indignation, she declared the deserts of her husband and herself, and asserted their right to the rewards promised them, urging the cardinal-minister at the same time, by every consideration of the glory and greatness of France, to encourage the development of its mineral resources. Unfortunately, in this work she furnished new material for the slanderous accusation of sorcery. In magnifying the art of discovering mines and springs, and the skill required for this purpose, she gives a description of the means employed, showing that these hidden treasures are to be detected—

1. By digging, which is the least important way;
2. By the herbs and plants which grow above springs of water;
3. By the taste of the waters which flow from them;
4. By the vapors which arise from them at sunrise;
5. By the use of sixteen scientific instruments and of seven rods (the seven rods of Basil Valentin), connected with the seven planets, etc.

The first four means were undoubtedly real and really employed. Under the fifth head, we have an illustration of what is so common in the alchemistic and other mediæval writers, namely, the covering of the facts of nature and the methods of investigation with assumed mystery, to hide them from the vulgar. So long as the baron and baroness were spending their own money for the good of the state, they were permitted to go on, and even received complimentary notices from time to time, which, indeed, could not be withheld from persons of such eminent reputation. But when they became troublesome in their demands for more substantial favors and came in collision with the "rings" which infested the kingdom, the charges of sorcery renewed against them furnished a convenient pretext for putting them out of the way. Richelieu may even have supposed that he was behaving in this case with lenity, since instead of having them burned to death, as he did with another sorcerer of the same period, he only put the baron in the Bastille (1642) and his wife in Vincennes, where they soon (about 1645) died in destitution and misery, victims not so much of the superstition as of the corruption of the times.

It will be noted that the treatise of the baroness did not claim for the divining-rod any moral virtue. What the Beausoleils appear to have done for this instrument was to bring forward its use in the discovery of springs as well as metals. The literature of that period seems to ignore in the main any powers of the rod in prophecies or moral discrimination.

(TO BE CONTINUED.)

A MINER'S RECKLESSNESS.—John Sykoski, the miner's laborer burned at Plymouth and removed to the hospital, is dead. The death of this man was scarcely less than suicide. If his act was not suicidal in intention, it was as bald a piece of stupidity as one ever encounters in mining operations. He had been up nearly all the night before playing pool, and without any need for powder, went to a covered box, removed the lid, took out a can of powder, unscrewed the cork and somehow brought the contents in contact with the flame of his lamp. The only theory that can be gleaned from the facts is, that he mistook a powder-can for an oil-can and poured the powder into his burning lamp. But the oil and the powder are kept separate, and in boxes at least sixty feet apart, and the man had been working five months in that chamber and knew all about it. He must have been stupid and dazed by drink and loss of sleep. He was burned too badly to explain how the accident happened.

THE FLOW OF WATER THROUGH PIPES.*

By Hamilton Smith, Jr., M. Am. Soc. C.E.

The following table gives the results of 88 experiments as to the discharge of water through circular pipes, ranging from 4 feet to ½ inch in diameter, and with velocities varying from 20 feet to ⅛th of a foot per second. The pipes were of rolled and cast-iron, glass, and wood; their interior surfaces varied from the almost perfect smoothness of glass to the roughness of old iron, much incrusted by the continued action of soft water. Of the 88 experiments given, 71 were made by the writer of this paper, and 17 have been selected from standard authorities, for the purpose of more extended comparison.

Experiments Nos. 1 to 15, inclusive, etc., were made at North Bloomfield, California, with three pipes laid side by side across a ravine about 100 feet lower than the pen-stock. They were made of single-riveted No. 14 sheet-iron; the rivet-heads had worn pretty smooth, and no deduction for them was made in computing the areas. The pipes had been carefully coated when first laid with a mixture of coal-tar and asphaltum, and their interior surfaces at the time of these measurements were quite smooth. They were put together in slightly conical joints, the greatest variation in diameter being about ¼ of an inch. The main joints were some 20 feet in length, put together stove-pipe fashion, as is always done in the California hydraulic mines. The various heads were obtained by adding to the length of the pipes at their outlets. The heads, lengths, and mean diameters are given with exactness. The amount of discharge was measured by running the water over an iron weir, the coefficients of whose discharge, with varying depths, had been carefully determined by absolute measurement, but at another point, and under conditions not exactly similar. This gauging was done with all the care practicable, the hight of the water being measured with a Boyden hook gauge, reading to ·001 of an inch. The limit of possible error in these experiments is probably not over 2 per cent. Experiments Nos. 6 and 7, however, are somewhat unreliable, owing to the stoppage of a stone passing through the pipe. The coefficient of contraction is assumed at 1 in these pipes, as each of them had a short funnel-shaped inlet, which was included in the measurement of their lengths. In Nos. 1, 6, and 10, the discharge was into a pool of water at the outlet-box; in the other 12, the discharge was into the air. There were two angles in the line of these pipes, one of 9 degrees and the other of 11 degrees; for the remainder of the distance, they were nearly straight; in the computations, no deduction was made for these bends.

No. 17 is based chiefly upon data given to the writer by the engineers who had the hydraulic works of the Spring Valley Mining Company in Butte County, California, in charge. It may be incidentally observed that this pipe was laid in 1870, and has remained in perfect condition ever since its construction. It is made of double-riveted sheet-iron, having a thickness of ⅜ths of an inch at the point of greatest pressure, where the actual head is 887 feet. The maximum tensile strain on the iron is 17·549 lbs. per square inch. The rivet-heads for one half the length of the pipe no doubt perceptibly retarded the flow of water. Round stones weighing about 25 pounds passed through the pipe with a velocity of 9·0 feet per second, while the computed velocity of the water was 10·78 feet.

No. 18 was a single-riveted sheet-iron pipe, with the interior surface worn quite smooth, and with joints put together stove-pipe fashion. The mean diameter, head, and length are given with exactness: the discharge was measured through a series of apertures, no great accuracy being practicable. The limit or possible error in this case may be as much as 4 per cent.

Nos. 22 to 28, inclusive, are the early experiments of Couplet, and seem to be reliable. The authorities for Nos. 16, 19 to 21, and 29 to 34, inclusive, are given in a note. Nos. 29 and 30, being the Rochester supply main of two different diameters, show an apparently excessive discharge. This was stated to have been directly measured by the filling of a reservoir of known size. Nos. 31 and 32 are given as illustrations of extremely rough surfaces. Mr. Kirkwood states that in No. 32—the Jersey City main—the pipe was comparatively new, which makes the very low coefficient of discharge quite remarkable.

Nos. 35 to 87, inclusive, were made by the writer at New Almaden, California. All these experiments were with straight pipes, and were made with considerable accuracy. The mean diameters were computed by the weight of water contained in the pipes, taken by the sum of the weights in the several joints, which varied slightly from the mean of the end diameters as directly measured. The discharge was determined by filling a tank of known size. The iron gas-pipes were joined by their usual couplings. The ends of the glass pipes were smoothly ground, and a water-tight joint made by an outside rubber band. The wooden pipe was joined by usual plug couplings. The funnel mouth-piece for the inch gas-pipe was 10½ inches long, with a mouth 6½ inches in diameter; the funnel for the inch glass pipe was 3½ inches long, with mouth 5 inches in diameter. These mouth-pieces were not included in the given lengths of the pipes. Nos. 35 to 52, inclusive, were made with the same pipe, which was new and in good order; it was first used without a mouth-piece, then with a mouth-piece, and afterward the pipe was dipped in a bath of boiling coal-tar and asphaltum, giving it a very smooth coating. Nos. 53 to 56, inclusive, were with a shorter section of the same pipe. The pipe used in Nos. 57 to 63, inclusive, has been in use for several years, was rather rusty, and was slightly incrusted by the action of lime-water. The method of obtaining the diameter—by the quantity of water contained—gave the exact size of the pipe at the time of the experiments. The glass pipes used were new and unscratched, of French manufacture, and somewhat conical. There were twelve joints of the inch pipe, which were nearly evenly matched in diameter at the junctions; the largest diameter was ·0875, and the smallest, ·0717. The measuring tank held 15·2 cubic feet, and the times were determined to ⅕th of a second.

No. 88 was with a new inverted siphon of double-riveted sheet-iron pipe, with a pressure of about 800 feet at the lowest point, with a maximum tensile strain of 16,500 pounds per square inch, and with most of the joints made by sleeves with lead packing. It was coated with the usual mixture of coal-tar and asphaltum. No deduction was made for rivet-heads, which for over one half the length doubtless formed noteworthy obstructions, as the pipe was of comparatively small diameter—17 inches. The mean diameter, head, and length are given with exactness. The discharge was measured first by the flow over a weir, and afterward through standard apertures; these determinations were not as satisfactory as could have been desired, although three separate trials gave nearly identical results. The chances are, that the discharge was slightly underestimated. A noticeable feature in this experiment is the fact that blocks of wood, loaded to a specific gravity of 1·05, passed through it with a velocity of 20·9 feet per second, while the calculated velocity of the water was only 20·13 feet. In several of the other experiments, similar tests always showed a less speed of the blocks of wood or stone than that of the water, which is readily to be accounted for by the blocks striking the rivet-heads. In No. 18, there was no noteworthy difference between the velocity of unloaded wooden blocks and that of rough stones.

In all the experiments made by the writer, the actual or total head was either the difference in elevation between the surface of the water in the pen-stock and that in the outlet-tank, or the difference between the water in the pen-stock and the center of the escaping jet, where the pipe discharged into the air. Experiments 35 to 87, inclusive, were made under the latter condition.

The standard of measure used was that of the United States Coast Survey. The temperature of the water in Nos. 35 to 87 was about 65 degrees Fahr. In the other experiments, from 50 to 55 degrees Fahr.

The writer here desires to express his obligations to the North Bloomfield Gravel Mining Company, and to Mr. J. B. Randol, manager of the Quicksilver Company, for the facilities afforded by them in pursuing these investigations.

These 88 experiments have all been reduced to the simple formula:

$$v = m\left(\frac{d\,h'}{l}\right)^{1/2}$$

Where v = velocity in English feet per second.
d = mean diameter.
l = length.
h' = effective head.
m = variable co-efficient.

This is identical with the usual form:

$$v = n\,(rs)^{1/2};\ 2\,m = n.$$

The effective head h' was derived from the total head h, as follows, c being coefficient of contraction at entrance:

$$h - h' = \frac{v^2}{2\,gc^2}.$$

The comparative results of these experiments when shown by graphic delineations, the coefficient m being used as abscissæ, and the velocities in feet per second as ordinates, prove that the value of m varies with:

First. The character of the interior or wetted surface, being very low with small, rough pipes.

Second. It increases with the velocity with smooth pipes, but this increase is slight with small, rough pipes.

Third. It increases with the diameter, which is to some extent a sequence of the first proposition.

It may be observed, in connection with the second proposition, that the coefficient m will be infinitesimal, with an infinitesimal velocity. In fact, with a minutely appreciable head, m will probably still remain infinitesimal, owing to the viscosity of the water.

The value of m at first increases very rapidly with the increase in velocity; this increment gradually diminishes until, with high velocities, m becomes nearly constant.

Mr. I. T. Fanning, in his *Treatise on Water Supply Engineering*, arrives at the same three general conclusions as those here given.

In the larger pipes, one of which discharged fifty cubic feet per second, it was not practicable to measure the water directly, on account of the large outlay which would have been requisite to build measuring-tanks. Any indirect measurements of flowing water, either over weirs or through standard apertures, are always unsatisfactory, as the slightest change in the conditions will affect the accuracy of the results. A discordance, however, is to be noted in these experiments (35 to 87), which is the low value of m in the pipe 16⅔ feet long, when compared with its value in the pipe 60 feet long (49 to 52) of the same diameter. This discordance leads to the belief that the usual correction for loss of head, due to imparting velocity to the water $\left(\text{loss of such head} = \frac{v^2}{2g}\right)$ should be modified. The discrepancy can hardly be caused by the deduction for contraction at the orifice, as experiments 35 to 41 and 42 to 48 give practically identical curves, and where first a considerable correction was given for the contraction, and afterward, with the same pipe, a very slight correction for the same cause. An extended series of experiments with pipes of the same size, but of widely differing lengths, made with proper care, is much to be desired, in order to definitely settle this point.

It may be remarked that some 150 additional experiments, made by standard authorities, have been carefully tabulated for purposes of comparison with the 88 here given. Their results were often contradictory, although generally confirming the correctness of the three general propositions before stated. The importance to the hydraulic engineer of this question is best appreciated by the statement that the experiments given show a variation in the value of m from 33 to 67. The first 87 had been tabulated by the writer before he designed and built the Texas Creek pipe—No. 88. The expected value of m for this siphon was then fixed at 66·5, this value being deduced from the preceding tests. The trial test of this pipe showed a value of 65·56, which, as stated before, is probably slightly less than its real value.

* A paper read before the American Society of Civil Engineers.

FLOW OF WATER THROUGH CIRCULAR PIPES. FORMULA $V = m\left(\frac{d}{l}\frac{h'}{l}\right)^{\frac{1}{2}}$. EXPRESSED IN ENGLISH FEET.

No. of Experiment.	l Length.	d Mean diameter.	a Mean area.	h Total head.	c Coefficient of contraction.	$2g$ Gravity.	h' Effective head.	D Discharge per second.	V Velocity per second.	Velocity of stones sent through pipe.	m Variable coefficient.	Remarks.
1	684·8	·9105	·6511	24·220	1·00	64·29	22·650	6·542	10·048	9·42	57·90	Experiments 1 to 15 inclusive were with riveted sheet-iron pipes of No. 14 iron, coated with coal-tar and asphaltum, and having been in use some five or six years; these three pipes were laid side by side across a valley about 100 feet lower than inlets, with no very sharp curves or angles. Pipes all fairly smooth, and joints put together stove-pipe fashion.
2	697·0	·911	·6518	19·005	do.	do.	17·832	5·661	8·685	.....	56·89	
3	713·9	·911	·6518	12·850	do.	do.	12·098	4·531	6·952	5·79	55·95	
4	721·3	·911	·6518	10·200	do.	do.	9·618	3·986	6·115	.....	55·49	
5	730·6	·911	·6518	6·555	do.	do.	6·203	3·099	4·755	.....	54·06	
6	684·9	1·056	·8758	24·510	do.	do.	22·711	9·419	10·755	.....	57·47	
7	699·6	1·056	·8758	16·690	do.	do.	15·519	7·601	8·679	7·4 (?)	56·71	
8	709·2	1·056	·8758	10·885	do.	do.	10·127	6·115	6·982	.....	56·86	
9	718·4	1·056	·8758	5·130	do.	do.	4·799	4·039	4·612	.....	54·91	
10	684·4	1·230	1·1882	24·390	do.	do.	22·036	14·617	12·302	11·88	61·82	Rankine. Section of long pipe.
11	695·6	1·230	1·1882	18·930	do.	do.	17·132	12·773	10·750	9·58	61·76	Measurements of discharge, 51·5, 48·5, and 52·8 feet per second. 50 feet is nearly correct.
12	705·0	1·230	1·1882	12·720	do.	do.	11·592	10·120	8·517	.....	59·89	Discharge not measured with accuracy.
13	710·7	1·230	1·1882	9·550	do.	do.	8·713	8·714	7·334	.....	59·72	Colinton pipe.
14	712·4	1·230	1·1882	8·545	do.	do.	7·813	8·152	6·861	.....	59·07	do.
15	719·9	1·229	1·1863	3·915	do.	do.	3·014	5·217	4·398	.....	55·99	do.
16	5·280·	4·	12·57	5·	.....	.....	5·	43·46	3·46	.....	56·22	Versailles pipe.
17	12·798·	2·43 (?)	4·64	150·0	.....	.....	150·	50·0	10·78	9·0	63·88	Iron and earthen pipe.
18	1·193·8	2·154	3·643	22·067	1·00	64·29	19·596	45·92	12·605	11·24	67·03	do.
19	29·580·	1·3333	1·396	420·	.....	.....	420·	9·516	6·816	.....	49·54	do.
20	25·765·	1·3333	1·396	230·	.....	.....	230·	7·333	5·252	.....	48·14	do.
21	3·815·	1·3333	1·396	184·	1·00	64·4	180·7	20·25	14·505	.....	57·72	do.
22	3·836·6	1·599	2·007	12·885	do.	do.	12·697	6·981	3·478	.....	47·81	
23	7·481·7	·4441	.....	·496	.....	.....	·496	.....	·1786	.....	32·92	
24	7·481·7	·4441	.....	1·007	.....	.....	1·007	.....	·2801	.....	36·23	
25	7·481·7	·4441	.....	1·488	.....	.....	1·488	.....	·3665	.....	39·00	
26	7·481·7	·4441	.....	1·872	.....	.....	1·872	.....	·4268	.....	40 49	
27	7·481·7	·4441	.....	2·132	.....	.....	2·132	.....	·4629	.....	41·15	
28	7·481·7	·4441	.....	2·220	.....	.....	2·220	.....	·4728	.....	41·19	
29	50·776·	3·	7·0686	16·517	143·720	.....	.....	27·00	143·72	14·360	2·0315	.....	65·031	Hemlock lake compound pipe, cast and wrought-iron.
30	51·495·	2·	3·1416	127·203				16·72			4·5709	.....		
31	11·217·	3·	7·069	20·215	.....	.....	20·215	21·204	3·00	.....	40·8	Croton main, much incrusted by soft water.
32	29·715·	1·6667	2·182	30·262	.....	.....	30·262	3·256	1·492	.....	36·22	Jersey City main. Comparatively new pipe (?), but much incrusted.
33	44·400·	1·25	1·227	226·	.....	.....	226·	4·25	3·46	.....	43·4	Crawley pipe.
34	6·600·	1·	·7854	34·5	1·00	64·4	34·3	.....	3·568	.....	49·5	Carlisle pipe.
35	60·172	·0878	·006054	8·330	·800	64·287	7·641	·03224	5·325	.....	50·43	One-inch new gas-pipe, untarred, and no funnel.
36	60·172	·0878	·006054	6·590	do.	do.	6·059	·02829	4·673	.....	49·70	
37	60·172	·0878	·006054	4·850	do.	do.	4·471	·02390	3·948	.....	48·88	
38	60·172	·0878	·006054	3·272	do.	do.	3·027	·01922	3·175	.....	47·77	
39	60·172	·0878	·006054	1·663	do.	do.	1 550	·01304	2·154	.....	45·29	
40	60·172	·0878	·006054	·787	do.	do.	·738	·00860	1·421	.....	43·30	
41	60·172	·0878	·006054	·473	do.	do.	·451	·00580	·958	.....	37·34	
42	60·247	·0878	·006054	8·317	·980	do.	·7·847	·03261	5·387	.....	50·38	One-inch new gas-pipe, untarred, and funnel at mouth.
43	60·247	·0878	·006054	6·506	do.	do.	6·147	·02850	4·708	.....	49·74	
44	60·247	·0878	·006054	4·847	do.	do.	4·588	·02421	3·999	.....	48·91	
45	60·247	·0878	·006054	3·276	do.	do.	3·107	·01953	3·226	.....	47 94	
46	60·247	·0878	·006054	1·669	do.	do.	1·591	·01331	2·199	.....	45·67	
47	60·247	·0878	·006054	·784	do.	do.	·751	·00869	1·435	.....	43·38	
48	60·247	·0878	·006054	·491	do.	do.	·473	·00637	1·052	.....	40·67	
49	60·264	·0873	·005986	8·353	do.	do.	7·873	·03258	5·443	.....	50·97	One-inch new gas-pipe, tarred, with funnel.
50	60·264	·0873	·005986	6·597	do.	do.	6·230	·02850	4·761	.....	50·12	
51	60·264	·0873	·005986	3·313	do.	do.	3·145	·01930	3·224	.....	47·77	
52	60·264	·0873	·005986	1·703	do.	do.	1·623	·01329	2·220	.....	45·78	
53	16·685	·0876	·006027	4·620	do.	do.	3·853	·04148	6·882	.....	48·39	
54	16·685	·0876	·006027	3·179	do.	do.	2·667	·03388	5·621	.....	47·50	
55	16·685	·0876	·006027	1·514	do.	do.	1·283	·02275	3·775	.....	46·00	
56	16·685	·0876	·006027	·623	do.	do.	·535	·01406	2·333	.....	44·02	
57	60·247	·0853	·005715	[8·315	do.	do.	8·020	·02438	4·266	.....	40·03	One-inch gas-pipe, with funnel; pipe had been several years in use.
58	60·247	·0853	·005715	6·563	do.	do.	6·332	·02156	3·773	.....	39·85	
59	60·247	·0853	·005715	4·846	do.	do.	4·679	·01835	3·211	.....	39·45	
60	60·247	·0853	·005715	3·278	do.	do.	3·167	·01497	2·619	.....	39·11	
61	60·247	·0853	·005715	1·684	do.	do.	1·630	·01045	1·829	.....	38·07	
62	60·247	·0853	·005715	·780	do.	do.	·757	·00683	1·195	.....	36·50	
63	60·247	·0853	·005715	·474	do.	do.	·461	·00520	·910	.....	35·62	
64	60·127	·0523	·002148	8·354	·825	do.	8·010	·00833	3·878	.....	46·46	Five eighths inch new gas-pipe, no funnel.
65	60·127	·0523	·002148	6·593	do.	do.	6·331	·09728	3·385	.....	45·62	
66	60·127	·0523	·002148	4·867	do.	do.	4·680	·00615	2·863	.....	44·87	
67	60·127	·0523	·002148	3·306	do.	do.	3·186	·00493	2·295	.....	43·60	
68	60·127	·0523	·002148	1·710	do.	do.	1·653	·00339	1·578	.....	41·62	
69	60·127	·0523	·002148	·813	do.	do.	·789	·00221	1·029	.....	39·28	
70	63·902	·0764	·004584	8·670	970	do.	8·255	·02296	5·009	.....	50·42	One-inch glass pipe, with funnel.
71	63·902	·0764	·004584	6·840	do.	do.	6·522	·02009	4·383	.....	49·64	
72	63·902	·0764	·004584	5·036	do.	do.	4·812	·01689	3·685	.....	48·58	
73	63·902	·0764	·004584	3·387	do.	do.	3·244	·01350	2·945	.....	47·29	
74	63 902	·0764	·004584	1·661	do.	do.	1·598	·00896	1·955	.....	44·73	
75	34·941	·0622	·003039	5·072	·820	do.	4·630	·01329	4·373	.....	48·17	Three fourths inch glass pipe, no funnel.
76	34·941	·0622	·003039	3·660	do.	do.	3·349	·01114	3·666	.....	47·48	
77	34·941	·0622	·003039	2·059	do.	do.	1·896	·00806	2·652	.....	45·65	
78	34 941	·0622	·003039	0·673	do.	do.	·628	·00425	1·398	.....	41·81	
79	11·127	·0418	·001372	3·025	do.	do.	2·569	·00609	4·439	.....	45·19	One half inch glass pipe, no funnel.
80	11·127	·0418	·001372	2·155	do.	do.	1·846	·00502	3·659	.....	43·94	
81	11·127	·0418	·001372	1·266	do.	do.	1·095	·00373	2·719	.....	42·39	
82	11·127	·0418	·001372	·816	do.	do.	·716	·00285	2·077	.....	40·05	
83	62·05	·1052	·008692	8·524	·800	do.	8·138	·03465	3·986	.....	33·93	Wooden one and a quarter inch pipe, no funnel.
84	62·05	·1052	·008692	6·696	do.	do.	6·395	·03059	3·519	.....	33·80	
85	62·05	·1052	·008692	4·942	do.	do.	4·722	·02615	3·008	.....	33·62	
86	62·05	·1052	·008692	3·309	do.	do.	3·161	·02146	2·469	.....	33·73	
87	62·05	·1052	·008692	1·567	do.	do.	1·501	·01437	1·653	.....	32·77	
88	4·438·7	1·416	1·571	303·6		·920	64·4	296·1	31·69	20·13	20·9	65·56	Pipe carefully tarred and comparatively new.

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ON THE DEVELOPMENT OF THE WATER-PRESSURE ENGINES IN THE FREIBERG MINING DISTRIOT.*

By Gustav Hahn, Obergruna.

(WITH SUPPLEMENT.)

Though more than seven hundred years old, the Freiberg silver mining industry has shown its vitality even under adverse circumstances. It owes its development not only to the richness of the ores, but to the extensive utilization of cheap water-power for hoisting and pumping. The oldest of this class of machinery, partially still at work, consists of large water-wheels, and, in spite of the large head of the water, they were almost exclusively used until 1820, a number of them often being placed below one another, in order to utilize the power. It is true that Mende built engines of a different type as early as 1768, but none of them is now in use, nor did they have any important bearing upon the development of the water-pressure engine in the Freiberg District, which must be dated from 1820, when Brendel rebuilt an engine put up in the Reicher Bergsegen mine to utilize a head of 287·75 feet. His design attracted a good deal of attention. It was put into the Alte Mordgrube, and had a head of 328·7 feet, a 16·72-inch cylinder, an 8·36-feet stroke, and, making four strokes per minute, showed an efficiency of 70 per cent. Its work encouraged the building of water-pressure engines in the district, and since then there have been built to date thirty water-pressure engines for pumping and hoisting purposes.

The Freiberg system for obtaining water-power is exceedingly elaborate. Eleven collecting-ponds are distributed near the Bohemian frontier, connected by ditches and tunnels. They have a capacity of 176,800 million cubic feet of water, and furnish the mines with from 1600 to 2175 gallons a second. The total length of the ditches and supply tunnels is 257,322 feet, paid for by the mines. For this water conducted into the mines, an outlet had to be provided, and thus a large number of tunnels were driven, the latest being the famous Rothschoenberg, which, with branches, is 166,572 feet long, and, according to locality, decreases the lift of the pumps and increases the available head of water by from 308 to 498 feet.

The water-power thus created, during so long a time and at so great an outlay, had to be utilized by the mechanical engineers of the Freiberg mines by water-pressure engines, and their principal aim has been to improve the valve-gear. One of the principal drawbacks of the valve-gear is, that it admits too great a velocity of the water when entering the cylinder, and that the cutting off of the pressure-water takes place too suddenly, so that strong concussions are brought about. Braunsdorf tried to get over the trouble by using an auxiliary valve-piston, while Schwannkrug tried double pistons.

It is important, to secure quiet working of a water-pressure engine, to have the descending rods move slowly, so that the masses moving with an accelerated velocity toward the end of the stroke can be stopped toward the end of the stroke without shocks. This is partly accomplished by throttling the water flowing from the main cylinder, and partly by an hydraulic counterpoise.

The engines shown on the accompanying supplement show the principal variations adopted in the Freiberg mines. Figures 1 to 4 exhibit the engine designed by Gustav Hahn for the Reiche Zeche mine. It was to be put in on the level of the Rothschoenberg tunnel, to be supplied with 6½ gallons a second of power water with a head of 404·7 feet, and making four 6·56 foot strokes per minute, lift the water from the fifth level, 337·3 feet below the tunnel and the water obtained in sinking the shaft down to the 6th level. The engine has a piston *a*, with cross-head moving in the working cylinder *b*, the latter being mounted on a base-plate resting on two iron beams. The regulating mechanism consists of two regulator cylinders, the main regulator cylinder *D* and the auxiliary regulator cylinder *E*, the regulator shaft *w*, upon which are mounted the levers *k* for the up-stroke, and *k'* for the down-stroke, moved by *s'* and s^2. By the oscillating movement of the shaft *w*, which is imparted to it alternately by *k* and *k'*, the lever *h* and the auxiliary regulating piston attached to it are moved up and down. The auxiliary regulator cylinder *E* is connected by a pipe with the supply-pipe *F*, and may be cut off by the cock *E'*. The water entering through this pipe flows into the auxiliary regulator cylinder between the pistons δ and δ', and when these two pistons occupy their highest position, it is conducted through the channel *u* into the main regulator cylinder. The motive water enters the main regulator cylinder *D* through the pipe *F F* and the cock *g*, between the piston β and the piston α, and escapes to the tunnel through the piston α'. This water may be throttled by means of a valve at *H*, thus retarding the down-stroke of the driving-piston. In the position shown, the engine is just beginning its up-stroke, s^2 has, through the medium of the levers *k* and *h*, depressed the auxiliary regulator piston to its lowest point, the space above the piston β is connected through *u* and *y* with the discharge-pipe, and therefore, as the surface of β is larger than that of α, the piston β will move to its highest position; α and α' follow this movement, α opening the supply-valve, admitting motive water into the driving-cylinder while α' has simultaneously closed the exhaust-valve. When the driving-piston has reached its highest point, the roller *s'* has lifted the lever *K'* to its highest point, and with it the piston δ δ'. The motive water flows from *k'* through *E* and *u* over the piston β, pressing it downward, closing α' and opening α. In order to prevent the piston β from suddenly attaining its highest position under the great pressure to which it is subjected in the beginning, when the supply-valve is not yet closed, it is important to throttle the exhaust motive water by the valve *y*,' so that by flowing off slowly it permits only a slow following of the regulator piston.

Figures 5 to 7 show a water-pressure engine designed by Herr Braunsdorf for the Rudolf shaft at Marienberg. It has a working cylinder with only one regulator piston α and the auxiliary piston α'. The arrangement of the auxiliary regulator cylinder is shown in the drawing. The lever *a* is moved up and down by *b* and *b'*, and this movement is transmitted to the auxiliary regulator piston. The engine has a head of water of 183·7 feet, a supply of motive water of 25 gallons a second, a stroke of 7·69 feet, and makes 4·6 strokes a minute. The velocity of the water entering the engine is 5·58 feet, but nevertheless it works quietly. This engine is also supplied with a throttle for the motive water at *c*, for the exhaust at *d* and at *g*.

The third engine, Fig. 8, is one designed by Herr Bornemann for the Zenith mine at Oberschoena. It differs from the two others in that the driving-piston is not a plunger, and that it works with an hydraulic counterpoise, the engine being mounted below the level of the tunnel, so that it has a counter column of 6·56 feet, an arrangement justified by the fact that the engine must on its up-stroke run a lifting set and on its down-stroke need only counterbalance a weak wrought-iron pump-rod. The arrangement of the main regulator cylinder with the two double pistons, the throttle-valves *a*, *d*, and *D*, is similar to that of the other machines.

* A paper read before the Saxony Section of the German Society of Engineers.

UTILIZING ASHES.

Mr. J. A. Shinn, of Pittsburg, has been for some time experimenting with, and has obtained a patent for, the use of ashes in making mortar. In the city of New York about 700,000 cubic yards of ashes are annually produced, which require to be carted to the docks, loaded upon boats, and taken to the lower bay in order to dispose of them, at a cost to the city of over $400,000.

In addition to this, the large manufacturers dispose of their own ashes in like manner at their own cost. The fine portion of the ashes of domestic production, that is, stoves, grates, ranges, and heaters, is capable of being converted, with a small proportion of lime, into a mortar having a tensile strength of from four to five times that of common sand and lime mortar, or about 80 pounds per square inch, one month old, to sand mortar 20 pounds at the same age, and, when mixed as béton, gives a tensile strength of 140 pounds and a crushing strength of over 1100 pounds per square inch, one month old.

It will thus be seen that, by utilizing the ashes for mortar, a large part of the expense of removal could be saved, together with the whole cost of procuring sand for that purpose, and at the same time a very superior article of mortar be produced.

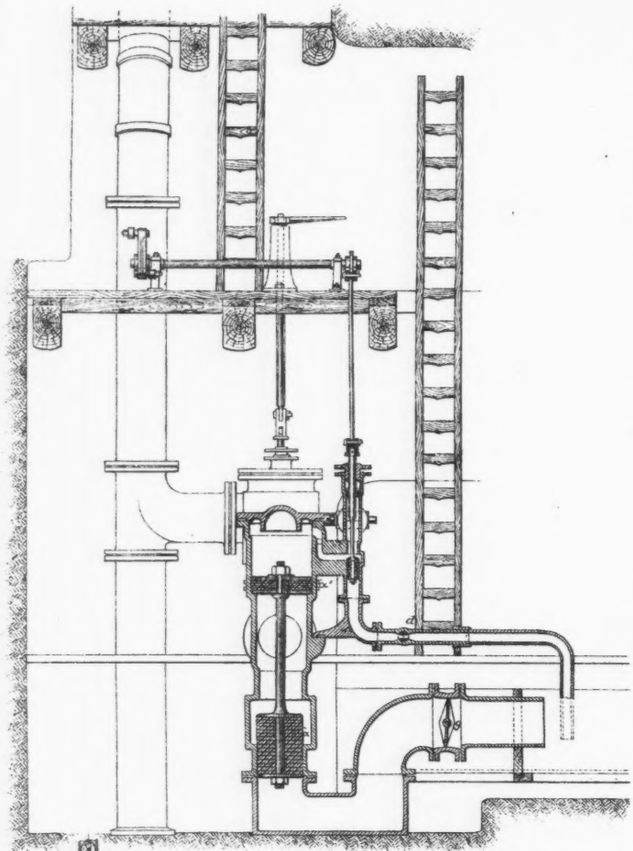
In consequence of the small quantity of lime required (10 per cent), it would be necessary to mix the mortar by machinery at a mill and deliver it ready for use. This practice prevails to a great extent in European cities on account of the superiority of milled over hand-made mortar. Ash-mortar has the additional advantages of resisting the action of water as soon as it has set (in from two to three days), and also the combined action of fire and water, the quantity of lime being so small and the chemical union with the ash so complete, that the application of heat does not produce free oxide of lime, as in the case of sand-mortar, and consequently does not swell when water is applied to the heated mortar. The weight of ash-mortar is about one half that of sand-mortar when both are dry, and it works soft and smooth. Ash-mortar forms, when set, a silicate of lime and alumina, and hardens uniformly throughout, like cement; while sand-mortar, when set, is but an imperfect carbonate of lime, the sand furnishing but the nucleus around which the carbonate forms.

Ashes made under steam boilers, or in other fires where a high degree of heat is maintained, are not suitable for mortar, owing to the chemical change which takes place in the fire; the finest part of such ash, that found behind the bridge-wall of the boiler, being found to be of the same nature as the coarse clinker, having no special affinity for lime, and being only fit for combination with cement or plaster.

THE TRANSVAAL GOLD-FIELDS.

The last mail from South Africa brings intelligence of a very satisfactory character from the gold-fields now opening up in the Transvaal. Various reports of the richness of the deposits in the neighborhood of Lydenburg have been received from time to time, notwithstanding efforts on the part of those who were first in the field, and endeavoring to obtain concessions, to keep the facts secret. There are now, however, several mining engineers in the district, surveying on the part of capitalists in Cape Town and elsewhere, and several of the newspapers have sent special correspondents to the fields, who all concur in giving the most satisfactory accounts of the quantities of gold lying ready to be worked. In many cases, the precious metal lies close to the surface, the loose soil requiring only to be dug up and worked. In others, rich quartz-veins extend in an unbroken line for two or three miles. On a slope of the Spitzkop farm, two claims which have been quietly worked for the last twelve months have yielded £6000 worth of gold; and the prospectus states that the deeper they go the richer the ground becomes. There is no hard quartz to break, the reef having become rotten or disintegrated by the action of the weather. Nuggets of twenty ounces and thirty ounces in weight have been picked up in the rubbish. Two diggers actually threw away lumps of quartz, which they have not the necessary appliances for crushing, but which have been proved to contain four ounces of gold to the ton. In consequence of these and similar facts, shares in claims owned by Cape Town adventurers have risen in value from £24 to £50 each. At another claim adjoining, a month's wash-up produced 420 ounces of gold, worth £1470. At a third claim, known as Gwynne Owen's concession, on the water-fall property, the ground is even richer, there being large deposits of alluvial soil, consisting in some places of nearly half pure gold. On Berlin, Lisbon, and Hermansburg farms, old Portuguese workings, forgotten for centuries, have been discovered, partly buried beneath overgrowing vegetation, but intersected with rotten reefs, yielding from 5 to 20 ounces of gold per ton. It would seem probable that these workings were abandoned from the same cause which has driven recent explorers back from the country farther north, in Matabele land and Eersteling fields—namely, the hostility of the natives, who prevented several parties from taking away specimens of gold. When proper machinery is erected on these new gold-fields, their value will be increased many times, the diggers at present employed there being satisfied to use merely the pick and shovel, and to wash the stuff in rude appliances through which a large quantity of gold is lost. In one case, a correspondent of the *Friend of the Free State* reports that "quartz is thrown away when actually gold is discernible to the naked eye."

Fig. 5.



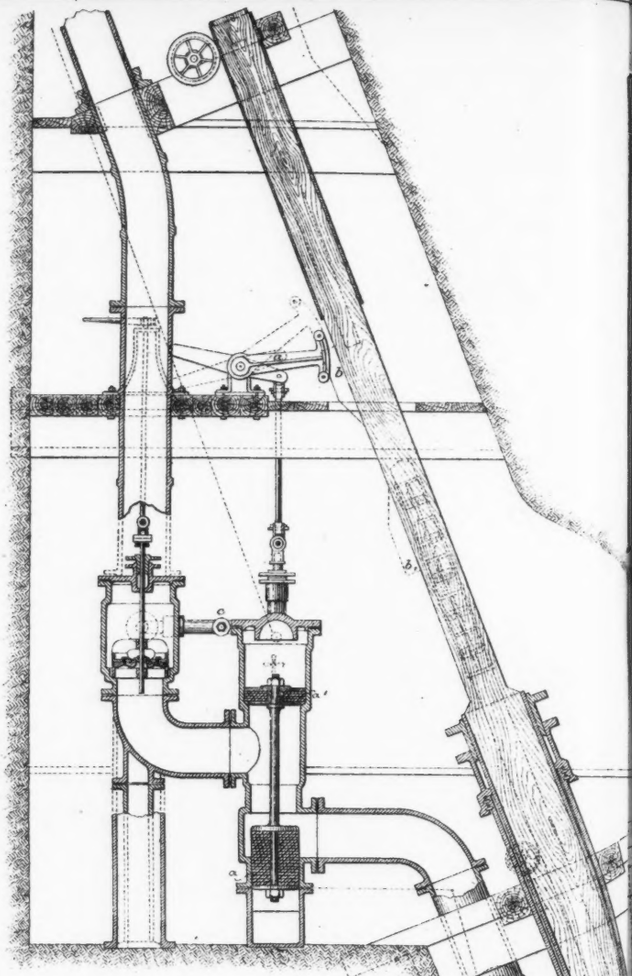


Fig. 6.

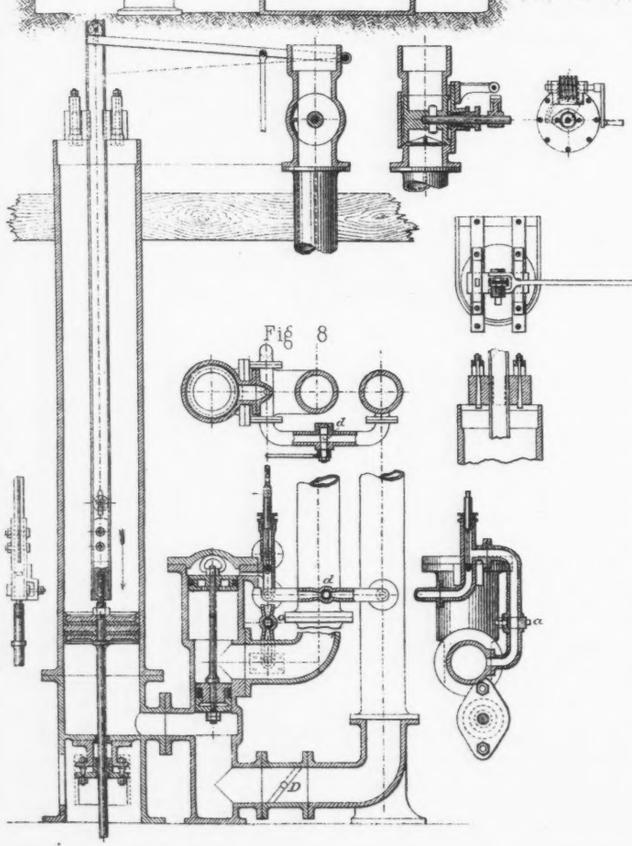


Fig. 7

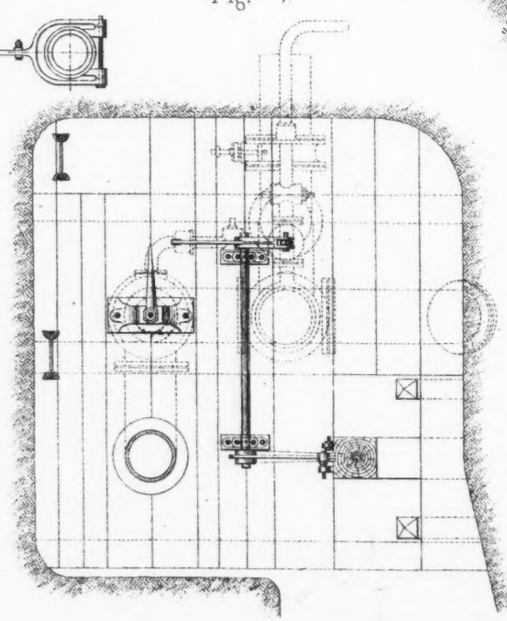


Fig 8

Fig. 3.

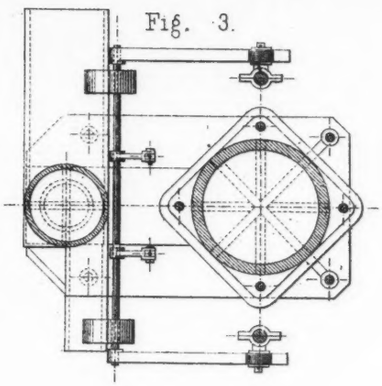


Fig. 4

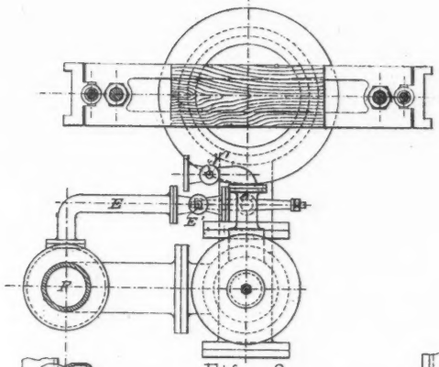


Fig. 1.

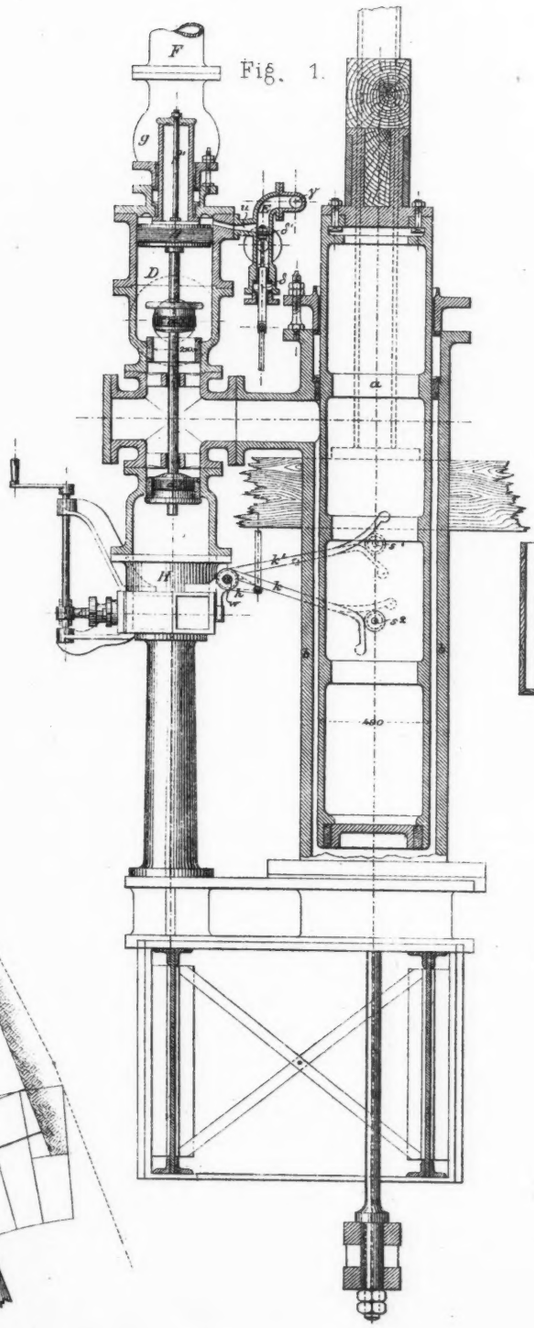
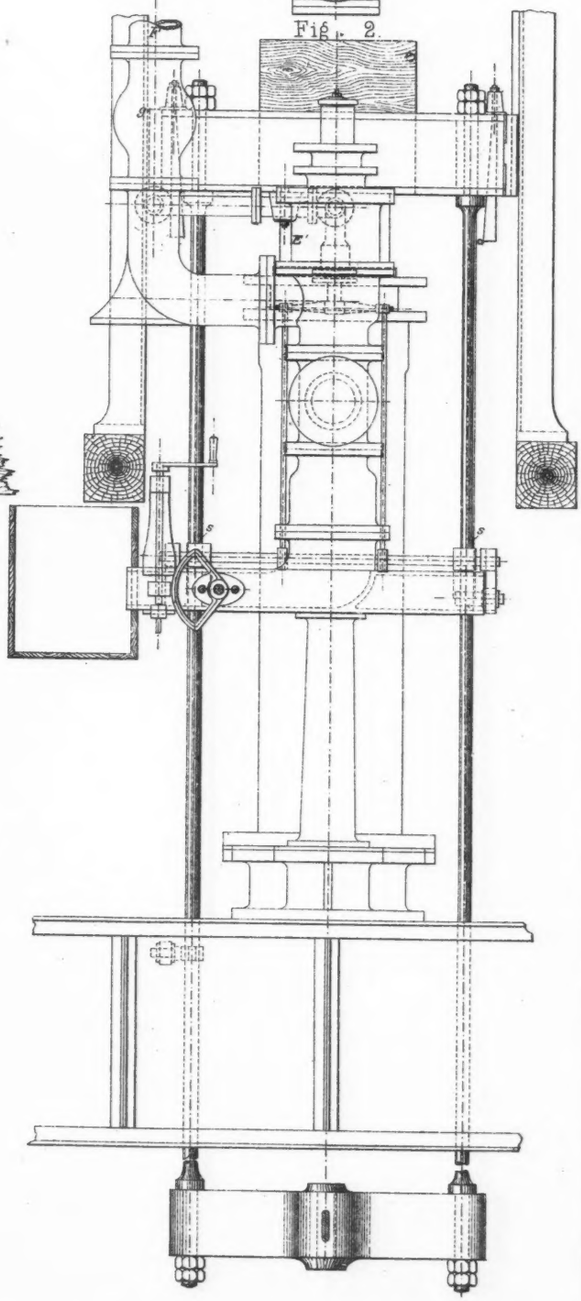
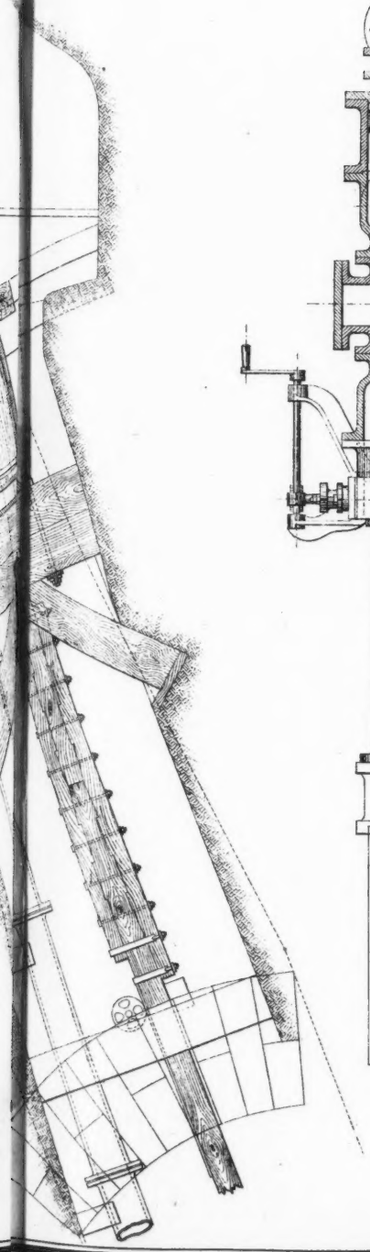


Fig. 2.





PENNSYLVANIA BITUMINOUS COAL AND CANADIAN IRON ORE.

The Buffalo correspondent of *Coal* has the following important communication in this week's number, and it is well worthy of consideration: Now here is some "brain-food" for your readers. Perhaps it may be conducive to their pecuniary advantage, and if so, I hope they will financially remember your correspondent. Closely connected with the coal production in the counties of Clearfield, Elk, Jefferson, and Indiana, Pennsylvania, which lie south of Buffalo from one to two hundred miles, are the iron and especially the steel industries, likely at no very distant day to become the leading industries of all that region. The carbonates of iron of the coal measures, which were formerly used in the smelting furnaces in some of these counties, are inferior, both in quality and yield, to the primitive ores so abundant in the Lake Superior regions. It takes on an average three tons of the carbonates to produce one ton of not very good iron, while one ton and a half of the northwestern ore will yield one ton of the best steel and iron; the same quantity of Canadian primitive ore, found near Kingston, produces the same quantity of iron; in both cases, the fuel required is in proportion to the weight of the ore. These primitive ores can be brought here in vessels and taken into the coal regions for use in the iron-works as return loading for coal cars, while the returning ore-carrying vessels can carry back coal, which will always be wanted in the cold climates north and west of us. It seems clear that these rich iron ores will supersede the lean ores of the coal measures for the reasons above given; their use will tend to the advantage of the coal trade. This makes it proper, while treating of coal, to speak of its kindred industries, steel and iron-making. By the by, it is a fact which has a bearing upon our railroad and navigation interests that vast amounts of the excellent iron ores of Elba, Spain, Algiers, and other regions in the old world are brought to Johnstown, Pa., for use in the extensive Cambria Iron and Steel-Works, to the entire exclusion of the local ores of that vicinity. If we should have direct railroad lines to that point from Buffalo, there seems to be no good reason why the ores of Lake Superior should not be sent there and fully supply their works with all the needed qualities.

FLAMELESS COMBUSTION.

Two papers have recently been published on this subject, which are of considerable interest. One by Mr. Fletcher, in *Dingler's Polytechnisches Journal*, 246, 293–5, states that, in experimenting with gas and air-burners, the author found that the smaller the flame produced, the greater was the heating effect which could be obtained from the consumption of a given quantity of gas. This result led him to reduce the flame as much as possible, and ultimately it was proved that under the most favorable conditions the flame would disappear entirely. If, for instance, a ball of iron wire be heated in the flame of a gas blow-pipe, and the supply of air be gradually increased, the jet of flame will become smaller and the temperature will gradually rise. Then, if after the ball has been heated, the gas tube be pinched for an instant so as to extinguish the flame, it will be found that there is a sudden increase of heat, and that the iron will be melted. A similar increase of heat during flameless combustion is shown if a lump of fire-clay be substituted for the iron wire, and petroleum vapor may be used in the place of coal-gas. The author's experiments are still in their infancy; it is hoped, however, that they will be the means of effectually utilizing much of the heat at present wasted. These experiments of Mr. Fletcher's have been repeated by Mr. Fischer—*Dingler's Polytechnisches Journal*, 247, 32–35—with the view of investigating the combustion products. For this purpose, iron wire was wound around the end of a thin clay pipe, so that a ball from 6 to 8 cm. thick was produced. This was treated as suggested by Fletcher, and while the ball was at its most intense heat, a sample of gas was withdrawn from the interior, the gas being drawn through the clay pipe and examined over mercury. The experiments corresponding to samples of gas I. and II. were made with the ordinary gas pressure; in experiment III., the pressure was increased, while the pressure in experiment IV. was still greater. The ball in experiment II. was made of very thin wire; in experiments I. and III., the wire was one mm. in thickness; and in experiment IV., the ball consisted of a mixture of both wires:

	CO_2	CO	CH_4	H	O	N
I	5·11	....	.....	....	6·26	88·63
II	5·03	....	.....	....	3·34	91·63
III	6·60	....	.....	....	4·98	88·42
IV	7·72	1·08	traces	0·32	traces	90·88

The composition of the gas corresponds with that of the gaseous mixture at the point of the flame of a blow-pipe or Bunsen burner; the small proportion of oxygen, however, shows that part of it is retained by the iron; moreover, it was found that, when thin wire was used, one half of the fused mass consisted of ferrosoferric oxide. Referring to the practical application of flameless combustion, the author considers that it is not available for solid fuel.

FURNACE, MILL, AND FACTORY.

It is stated, as a result of the strike of the workmen in the rolling-mills at South Chicago, where 1800 men are usually employed, that the management has decided to shut down for an indefinite period.

The double shift at the Bethlehem steel mills continues, and on the 1st the fires in the puddle mill were started. A large body of union men was addressed in the morning by Vice-President Lee and William Jones, of Pittsburg. Money is distributed liberally among the men who are loyal to the union.

The preliminary steps have been taken to establish at Newport News, Va., extensive fertilizer and chemical works, the latter for the production of sulphuric acid from iron pyrites, which abound along the line of the Chesapeake & Ohio Railroad, the supply being, it is said, inexhaustible and rich in sulphur. The effect of these works will be to reduce the price of fertilizers by cheapening the cost of the acid, which is one of their principal constituents.

The Harrison Boiler-Works, Philadelphia, Pa., have been having tests made of their boiler by Professor Morton, of the Stevens Institute of Technology. In his preliminary report, Professor Morton informs the company that it can safely guarantee an evaporation of nine pounds of water into high-pressure steam for each pound of coal burned, and that under all conditions the steam is completely dry, showing a slight amount of superheat. In regard to capacity as compared with rated size, a 50 horse-power boiler developed (on a basis of thirty pounds of water) from 64 to 75 horse-power, varying with the kind of coal used. Neither of the coals used showed less than 16 per cent of refuse. The evaporation during the capacity tests above referred to was, per pound of coal, from 9·25 to 9·93 pounds, and per pound of combustible from 11·04 to 12·5 pounds of water. The feed-water was heated to 212 degrees, and the pressure under which the water was evaporated was about 70 pounds per square inch. In a test with a blower, the 50 horse-power boiler developed 137 horse power.

The new plate mill of the Springfield Iron Company, which was recently started, is thus described by the Illinois *State Journal*:

The outfit of new machinery consists of a Porter-Allen automatic cut-off engine, with a cylinder 44 by 48 inches, and a fly-wheel 27 feet in diameter, and weighing something over 20 tons. This engine is calculated to make over 100 revolutions per minute. Then comes the train of three-high plate rolls, which are 31 and 20 inches in diameter and 110 inches long. They are furnished with massive housings, pinions, spindles, and coupling-boxes, and also with a pair of small steam-engines, whose only office is to work the screws which raise and lower the rolls. Accompanying the rolls are two massive tilting-tables, each 30 feet long, with driven rollers, which receive the steel as it comes from the furnace and send it backward and forward through the rolls until the work on it is complete. The operation of these feeding-tables is very complete as well as interesting. By their use, very heavy plates can be rolled, and with a very great saving of labor. When the plate is finished, it is to be pushed off the end of one of these tables endwise on to a cooling-bed. This consists of a series of cast-iron boxes, filled with water to keep them cool, and furnished with loosely-fitting covers. The plates rest on these covers and become perfectly straight and smooth while cooling and before removal. This bed is over 40 feet long, and arranged to accommodate a very long plate. When the plates are cool, they are raked off this bed sidewise by hydraulic machinery on to a bed, where they can be allowed to accumulate if necessary. From this they are taken by a hydraulic crane, and either distributed on the floor preparatory to marking for shearing, or they are taken directly to the shears, to be trimmed and cut into shapes desired by the customers for whom they are intended. These shears are a curiosity. They weigh over 70 tons, are driven by an engine big enough to run a flouring-mill, and will take off at a single bite a piece of steel 100 inches long and 1¼ inches thick. When the plate is sheared, another hydraulic crane takes it up and swings it on to the cars on which it is to be shipped, a railroad track having been laid directly into the new mill for that purpose.

The following concerns were the contractors for the different parts of the new plant: The Southwark Foundry and Machine Company, of Philadelphia, furnished the engine; the rolls and train were made by A. Garrison & Co., of Pittsburg. Mackintosh, Hemphill & Co., also of Pittsburg, furnished the feeding-tables; and Morgan, Williams & Co., of Alliance, O., the cooling-bed, cranes, and shears.

The capacity of the Siemens and Pernot furnaces is 500 tons of steel ingots per week without forcing. They are charged into two very large Siemens gas heating furnaces. After heating, they are drawn out by hydraulic machinery and deposited on the feeding-tables before referred to, and the process follows as already described. The weight of these ingots will generally be about a ton, but some have been made of two tons, and sometimes even up to 6000 pounds. The thickness of the ingot is from 9 to 12 inches, according to its weight, and its width is 20 inches. When the plate is finished, its thickness has been reduced to about one quarter of an inch. The width is anything desired up to 110 inches, and the length as desired up to 30 feet.

GENERAL MINING

ARIZONA.

BIG BUG DISTRICT.

Gus F. Stoddard, of Stoddard, has sold to Marcius de Leon an interest in the Hold Fast, Bonanza, Fair, Wide Awake, and several other valuable mining claims in the Big Bug and Agua Fria districts, the consideration being $8000. These claims, so far as developed, are remarkable for their richness, and possess every indication of true fissure-veins, and will undoubtedly prove rich bullion-producing properties, as they are situated in a section of country noted for its mineral wealth.

COCHISE COUNTY.

CAVE.—From Bisbee, it is reported that in this mine, on the eastern slope of Copper Queen Hill, a large cave containing considerable quantities of copper ore has been discovered.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The Clifton *Clarion* says: In the report of Messrs. Williamson and Rankine, the Scottish engineers who visited Clifton last month, we find the following in regard to three groups of mines belonging to this company:

QUEEN MINES.

In our first report, we touched lightly upon the ore found in these mines, as the works had not progressed to any advanced stage. Since then, a large amount of work has been executed, and the Queen mines have now developed into a valuable property. The vein to which we referred as being irregular has proved to be a true fissure-vein, which has been drifted into by upper and lower levels, disclosing a large quantity of high-grade ore. The width of the vein runs from two to three feet, and an output of over thirty tons per day may now be regularly had for many months at small cost, even supposing nothing more should be disclosed. Of course, mines must be continued in the strike of the ore and the greater depths. The ore, to all appearances, continues to improve as the mine deepens, the strike of the vein being indeed traceable on the surface to depths below that to which it has already been opened out. The mines have now been connected with the private railroad by a self-acting incline, 1500 feet in length, of excellent construction, as all the inclines are, so that the ores may be readily sent to the works.

CORONADO MINES.

A large amount of work has been executed at these mines. The day tunnel has been drifted nearly through the crest of the hill, having advanced a total length of about 1400 feet, measured from both ends, which will reach connection within from forty to fifty yards. A greater length of it is in barren ground than we anticipated; but that is partly accounted for by the fact that latterly the object has been to push it through in the ground where the material was softest. Some exploring side mines and shafts have been also driven, but these have not been generally so successful in finding ore as we should have liked. On the other hand, additional shafts and short mines farther down the hill, on the Boulder and Horse Shoe claims, have disclosed rich and valuable bodies of ore, so that altogether we see no reason to depart from the opinion we formerly expressed regarding the value of this group. A considerable quantity of ore has been accumulated at various dumps, and there will be no difficulty in sending away and maintaining a daily output of thirty or forty tons.

METCALF MINES.

The work done at these mines has been of considerable extent. A self-acting incline, 1200 feet in length, has been completed to these mines, and a proportion of the ore now used is regularly sent to the smelters. There is a quantity of ore, estimated at 800 tons, on the dump, and we see no difficulty in obtaining a regular supply of over 40 tons per day, at a moderate cost per ton, from these

mines; but we have not the requisite data for offering an opinion as to the permanence of the output.

The railroad for connecting the works at Clifton with the public railroad at Lordsburg is making rapid strides toward completion. At the time of our inspection, forty-two miles, next Lordsburg, were completed, which we traveled over by train. Some delay had occurred in the delivery of rails; but assuming these to be sent regularly forward, as we understand will be the case, the works otherwise are so far advanced that the line may be completed to within about six miles of Clifton in a few weeks. The facilities that will be given by the railroad will tend very much to the economical and regular working of the whole properties of the company.

SILVER KING.—The Pinal *Drill* says: The men are working on the 700-foot level, extending the sill-floor in the breast north and east, and also stoping on the second, third, fourth, fifth, and sixth floors of the same level, extending the sill-floor of the 500-foot level still, preparatory to stoping. All work has been stopped on the 800-foot level until the air improves with our summer rains, and which one good shower will accomplish. We have had no rain at the King, but plenty at Pinal. The blower is set, only waiting for pipes, so as to be independent of seasons, and permit the workers to have good air, whatever the weather. About 100 men are employed.

YANKEE BOY.—A big strike is reported in the Yankee Boy, situated a little north of the Silver King. The Yankee Boy has lain still for some time on account of too much water in the shaft, but now, since relieved of that inconvenience, the gravel has been passed, and large deposits of rich ore in the main lead have been found.

SILVER DISTRICT.

CLIP.—Only ten months ago, this mine was considered a prospect, nothing more; but Hiram Shipman and A. G. Hubbard saw a fortune in the claim, and secured a bond on it, and G. W. Bowers became interested with them in the property. Immediately after securing the option of the property, a thorough development of the ledge was made, and the mine was purchased. A road was built to meet the county road, and the grading for the mill at the river begun. Every thing on the property was done in an economical, systematic manner. The ledge was cut at various places, another shaft sunk, and careful samples taken of all the ore in sight. The Clip mine is about seven miles from the Colorado, in Silver District, and distant from Silent five miles north. The ledge is fully 125 feet wide in places on the surface, and can be distinctly traced beyond its side-lines on to the Alberta mine. The croppings and ledge-matter cut by the tunnel are 150 feet high and give good No. 1 ore, ranging from 18 to 27 feet between walls, all pay. This rich body of ore is known to extend fully 300 feet in length, and how much more can only be determined by further explorations. In addition to this great mass of ore uncovered, there is a quantity of $20 rock, enough to run a mill for years. Rock going $20 per ton, in this mine, can be worked to a profit, as the ore is easily mined, scarcely any powder being used. Four men can take down fifty tons of mineral per day. The $20 rock, however, is only a reserve, as there is sufficient ore of higher grade to keep the mill busy for two years to come. A cable road conveys the car loaded with rock to the ore-bin from the mine.

TOMBSTONE DISTRICT.

TOMBSTONE.—Under date of the 22d ult., Prof. John A. Church has sent the following report to this company:

We made a good strike in the West Side fourth level yesterday, and to-day it showed some very rich galena, value not known, but probably from 60 to 70 per cent lead, and I presume above 500 ounces of silver per ton. This kind of ore was found only toward evening, and I shall not see it until to-morrow. Aside from its value, the find is important, because it occupies a block of ground which was barren on the third level.

As you know, we have just south of the No. 3 shaft, on the third level, a Λ shaped stope, the ground dipping both ways from an apex, and carrying ore on both stopes. On the third level, there is no ore between the two stopes of the Λ, but the new strike is between them. It dips southward, parallel with No. 2 winze from the third level, which has gone down to the fourth on ore, and is about 35 feet distant there from the new strike. I suppose this new body of ore is developed from 4 to 6 feet thick.

Northward, the fourth level has passed one ore-streak about two feet thick, and this morning appeared to be approaching another. In this direction, the inclined portion of No. 1 winze has been carried about half-way down to the fourth level; and if it continues as it has every appearance of doing, should reach the fourth about 120 feet north of the shaft. From present appearances, the large ore-bodies which stretch for 80 feet along the third level near shaft No. 3 will cover 200 feet on the fourth level. These stopes on the third are yielding largely and continually and of high-grade ore. They are already the thickest we have had in the West Side, and are getting larger every day. We have not yet carried them to the second level, though the ore is known to rise to that point. I have frequently spoken of the fact that on the third level the ore lies in sheets crossing the line of the vein and ending on the west in the main vein and on the east in a branch from it. One of these sheets measures 34 feet in length, from 2 to 4 feet in thickness, and, so far, has been carried 75 feet high. Within the Λ shaped mass we have had, so far, three of these sheets dipping northward, and two dipping southward; and if they all have the same length, we shall get twice the usual quantity of ore out of a given length of vein. In many ways, this portion of the mine is looking even much better than I expected to see it. Hitherto, our attention has been given principally to the branch vein, which was much larger than its parent; but lately we have been stoping in the latter, and it seems to be as large as the average in this mine, and yields very high-grade ore. It looked small simply by comparison. Though it is somewhat early to venture an opinion, I suppose the fourth level will yield twice as much ore as the third, and the grade can not fail to be an improvement.

At the south end, No. 1 shaft will be connected down to the third level within two days. I shall then timber it and drift southward with strong hopes of adding from 200 to 300 feet to our ore-ground. Northward of the No. 3 shaft and the large stopes near it, we are not doing so well. The drift is 120 feet from the shaft, but the vein is small and the rock black and blocky. The presence of ore in the survey shaft, 400 feet north of No. 3, is our only encouragement there; but these conditions are likely to improve on the fourth level.

No. 3 shaft is going down, and is thirty feet below the fourth level. We are likely to reach the fifth level some time before the fourth is fairly opened, and our work will then be a long way ahead of our needs.

No. 7 on the Tough Nut looks as well as ever, but is not worked hard.

At the mill, our bullion shipments are $1000 ahead of last month, and the little interregnum of low-grade ore of which I spoke in my last letter is passed. Yesterday's amalgam was 150 pounds more than we have had before.

The furnace is running well; but we have got to a part of our old pile of concentrates that was made from Gird tailings at a time when the ore carried little lead, and our shipments have fallen off in weight, while they have increased in value per ton.

The new concentrating mill has part of its machinery in place. Mr. Handley is working vigorously, and when every thing is finished, our work will be done on the best methods and our whole plant be the most perfect in America.

We took 500 tons of manganese from the Stonewall last month; and as that mine is now closed, I shall increase the force at the Lucky Cuss somewhat. That property is still looking well. We are working in two places and know of four others where manganese can be had.

The new prospect found on the Tribute proves to be small—only four inches thick; but the ore seems to be high in grade. It is worked by the discoverers on tribute at present.

The rainy season proves to be violent only in wind. The prospect is, that our dam will hold.

CALIFORNIA.

THE CALICO DISTRICT.

BLACKFOOT.—Work is progressing on this claim with favorable results. An incline-shaft has been sunk twenty-four feet, in about the center of an open cut some fifty feet in length. It is estimated that the body of ore that is opening is at least 100 feet wide, and it extends to the bottom of the shaft. How extensive the deposit of ore is, can not be definitely determined, but, judging from the work already accomplished, a great many thousand dollars will be extracted before it is exhausted. Ore has been stoped out twenty feet on both sides of the shaft. About ten tons have been shipped to San Francisco, and there are about fifteen tons of ore on the dumps, including 113 sacks. Another milling will be made shortly.

SNOW BIRD.—A few days ago, work on the Snow Bird was suspended, but operations will be resumed within a month. This mine, although it was not so rich as was first expected, has been yielding very good returns in bullion to its owners. A number of rich pockets of ore on the surface have been exhausted apparently, but new places have been opened that have yielded well. Recently, in a cut along a vein which is now fifteen feet in length, seven tons of ore were taken from a place broken up by one blast of powder. This ore was taken to the Oriental mill, twenty-one sacks of which assayed 400 ounces, and the rest from 75 to 219 ounces. The last shipment of ore to the Alhambra mill averaged very high—the returns from the first grade of the same, $520 to the ton and the second grade, $239. The cut mentioned above is running in a body of ore about fifty feet in length, and twelve or fifteen feet in width. The men are down over six feet, and there is ore on the bottom. This body of ore will no doubt yield many thousand dollars before it is exhausted.

INYO COUNTY.

MONTEZUMA.—About ten days ago, a new body of ore, measuring many tons, was opened on the Montezuma mine. It is of fine grade, and gives promise of being as extensive as the body heretofore opened and developed. The new find is situated about 300 feet below the present dump, and dips into the hill as if it ran into and formed a part of the deposit from which the old body of ore is an output. It is exceedingly suggestive in that it indicates the presence of a very extensive deposit throughout the entire hill. Explorations at this point will be vigorously prosecuted, and it is confidently expected that the results will largely increase the extent and value of the property. It is the opinion of several leading experts who have recently examined this property that the Montezuma is a large and permanent mine, and that the wonderful product of Cerro Gordo will be here rivaled. On Monday last, the Furnace site was located and surveyed; a side-track laid out, and at the present time, the grading and track-laying are carried forward to connect the site with the main railroad track. The material and lumber for the furnace are *en route*, and will all be on the ground by the first of next week, when work will be begun and prosecuted in earnest. The mine and furnace are owned by the Owens River Mining and Smelting Company. The station and grounds have been named Elma, in honor of the daughter of Mr. W. P. Miller, superintendent of the company.

NEVADA COUNTY.

The county board of equalization at Nevada City has made reductions in the assessments of hydraulic mining properties aggregating nearly $200,000. These reductions were confined to the North Bloomfield, Eureka Lake, and Milton companies. The assessment on the Manzanita Company was increased $16,000. The quartz mines were allowed to stand as assessed.

The suit of Hill & Hill *vs.* the Eureka Lake & Yuba Canal Consolidated, which was an ejectment to recover certain property valued in the neighborhood of $50,000, has been compromised and dismissed from the Superior Court, where it has so long been on trial. Defendant pays to plaintiffs the sum of $5500.

CANADA.

LAKE SUPERIOR.

SILVER ISLET.—A rich strike is reported from Silver Islet, the miners having struck a rich pocket of silver in the 1160-foot level. These pockets of silver have been phenomenal in this mine, and, whenever found, have always been very productive in silver. The news had the effect to send up the price of stock in the Boston market, where it is principally held, from four to eight dollars per share.

COLORADO.

Governor Grant has appointed John T. McNeil, of Clear Creek County, State Coal Mine Inspector, in accordance with the recommendations of the Board of Examiners, which has been sitting at the State House. The applicants were Mr. McNeil, Thomas J. Williams, and Mr. Dwight, all of Coal Creek; John Nichols, of Golden; Henry Brigs, of Denver; and Daniel Rees, of Erie. The examinations were very rigid, and all contestants are satisfied with the manner in which they were conducted.

CLEAR CREEK COUNTY.

The *Register-Call* prints the following statistics of production for the first six months of this year:

Smelting ore sold	$488,175.00
Gold bullion	463,9[illegible]0.80
Tailings sold	219,240.00
Gold from United Gregory	35,000 00
Ore sent directly to smelters and sampling-works in Denver	50,000.00
Total	$1,256,315.80

The total production of Gilpin County for 1882 was $2,006,516, and a glance at the figures of the first half of 1883 shows an increase of $250,000. The outlook for the ensuing six months of the present year is such as to warrant the prediction that the amount of smelting ore and mill-dirt that will be marketed and treated will equal if not exceed that portion of the year reviewed.

The Union Reduction Company has its new mill and concentrator about completed, and will start the new machinery within a week or ten days. Ore is received from all parts of the district, and by the time the mill starts, there will be a sufficient amount of ore on hand to keep it going for some time. All the ore received thus far is high grade.

CYCLOPS.—The main shaft has been sunk 92 feet, and timbered in a substantial manner; plats have been cut and levels inaugurated at the respective depths of 375 and 440 feet. The present depth of the main shaft is 450 feet. In addition to these improvements, 200 feet of winzes have been sunk, 800 feet of levels driven, and 75 fathoms of ground stoped out, which produced 275 tons of ore which has been sold to the smelters, containing 24,680 ounces of silver, having a currency valuation of over $26,000. In addition to that sold, a large amount of ore, suitable for concentrating, has accumulated on the dumps. The management has had but one object in view, that of developing the property thoroughly and sytematically. The above statement is the best attestation of that fact. The main shaft will continue down to the depth of 800 feet, stations

and levels adopted at convenient intervals below the 440-foot levels. The mine has more than paid for all dead-work. Over the main shaft is a conveniently-arranged shaft and ore-house, and a powerful plant of machinery.

GUNNISON COUNTY.

The Rose & Reed concentrator has shut down until stamps can be put in. It was discovered that the rolls would not effectually crush the ore, and it was deemed advisable to waste no further time with them, but to set about immediately putting in stamps. Operations will probably begin in two or three weeks.

LAKE COUNTY.

The Harrison Reduction-Works, at Leadville, will close down temporarily on account of scarcity of ore.

The Esty & Sampson concentrating-mill is running on material from Catalpa waste-dump, and also slums and tailings from a lot of refuse material known as the "Seventh street dump." The stuff had all been run through an imperfect concentrating device once before; but Mr. Esty states that the mill is doing very well with it.

ADLAIDE.—The lessees of Adlaide and Terrible mines, according to all reports, have struck the largest bonanza yet opened by lessees in this district. The mine now shows a breast of ore nearly one hundred feet long and of exceptional strength. Conservative estimates place the resources at 5000 tons, which will net at least $100,000. So far this month, the mine has shipped at least twenty thousand dollars' worth of ore. The shipments average thirty tons a day of ore having an average value of forty-five dollars per ton. Deducting royalty, smelting charges, and cost of mining, the ore leaves the lessees about twenty dollars per ton, and it is said that the average daily income is at least five hundred dollars. The ore-body was opened near the Adlaide No. 2 shaft. The lessees are Messrs. E. R. Holden, A. Chanute, Charles Taylor, and L. P. Feustman.

ARGENT.—The mining reporter of the *Herald* has visited the Vining mine, on Rock Hill, the property of the Argent Mining Company, of Philadelphia. The mine is working under the management of Mr. J. L. Loomis, and for eighteen months past has proved a limited but regular producer. The shaft on the property has a depth of about 340 feet, passing through boulder wash and porphyry for 300 feet, and penetrating the underlying limestone about 40 feet. The underground workings show quite extended developments radiating on the line of contact, in all directions from the shaft. The limestone shows numerous and heavy rolls, and frequently irregular elevations. The favorable appearance of the cap-rock, as well as the underlying limestone, would indicate a generous contact and fine ore. An inspection of the mine, however, soon corrects this erroneous opinion, and shows the visitor that Mr. Loomis has had much to contend with in keeping the mine in a producing condition. The ore-bodies where found are generally weak and irregular. The mineral seems to be located on the highest points of the lime, and occurs in thin sheets, ranging from two to twelve inches in thickness. Occasionally, the mineral fills cavities and subordinate sags in the bedding-floor, but these are generally quite limited in their extent. The prospects for opening larger resources are favorable, and a great deal of judicious exploration-work is going on. The resources of the mine, while not large, are nevertheless sufficient to guarantee a regular production for a considerable time in the future, and permit the mine to make continuous shipment while prospect work is carried on. The ore is a gray sand carbonate, running well in both silver and lead.

AUSTRALIA.—Upon Little Ellen Hill is situate the Australia, a property that has come into recent prominence, and which has made phenomenal strides during the present season. The operators have a six-foot body of carbonate ore, from which they are shipping between fifteen and twenty tons per day that nets them about $30 per ton. There is a shaft eighty feet deep upon it, from which an incline runs west over 30 feet.

BRADSHAW.—The principal workings of this mine, on Printer Boy Hill, has been a tunnel, which has been worked to a distance of 800 feet. A two-foot vein of gold ore has been struck, an assay of which returns the handsome amount of six ounces in gold. The ore is sacked and shipments will soon begin.

CATALPA.—The Catalpa and Crescent mines show very little ore at present, and appearances would indicate that the mines are about worked out. The ground has been thoroughly prospected, and after this month no more money will be expended in exploration-work. The lessees have also nearly exhausted their available resources. The Catalpa mine shows large masses of fine iron ore, but the mineral can not be extracted at a profit at the present price of iron ore.

CHRYSOLITE.—A contract has been closed within the past few days which will give Leadville a new twenty-stamp mill as soon as it can be erected. For some time past, Messrs. N. H. Cone and Eben Smith have been negotiating with the Chrysolite Company for the large dumps of low-grade iron ore on its premises. The officers of the company, after considering the matter thoroughly, finally advised giving the contract, and last week the board of directors of the Chrysolite Company authorized its officers to close negotiations with Messrs. Cone and Smith, on a contract whose term of existence is nominally placed at forty-five years. The ores embraced in their contract are the large dumps of iron and mineralized vein-matter scattered over the premises of the Chrysolite consolidated mines, and estimated to contain about 40,000 tons of milling ore. The mineral is the same as that on which Mr. Clark made numerous experiments in concentrating, etc. After thoroughly testing the ore, it was found impossible to do any thing with it, except to run it through a crushing and amalgamating mill. The dumps were next measured and sampled, and their contents ascertained, which were found to be only thirty pounds of lead to the ton and not silver enough to pay for smelting. A profit of from two to three dollars per ton was, however, estimated as possible, by treating the ore under stamps. These results were reported to the company, and the directory seeming rather averse to making any heavy expenditure for a stamp-mill, and assuming the consequent responsibility, decided to let the present contractors assume the risks and put up a mill. The contract calls for the ores now on the dump and such ore as may in the future be taken out, that can be milled at a profit, but is of too low a value to make a profitable smelting ore, and will be paid for at a stipulated price per ton. The milling material now out and that which it is expected will be extracted in pursuing work in the mine, is calculated to keep a twenty-stamp mill continuously employed for the next three years, and will give the Chrysolite Company from $75,000 to $100,000. The company also furnishes the mill with water privileges, a mill-site, and a right of way for tramways from the different dumps to the mill. Regarding the mill, Mr. Cone said it would be at least twenty stamps, and fully equipped with the latest improved machinery now in use in silver mills. He has been in correspondence with manufacturers of the Boss continuous amalgamating process, and thought very favorably of it, but wished to satisfy himself on a few points before making a final decision.

GOLD LEAF.—The lessees of the Gold Leaf, belonging to the Humboldt Mining Company, are at present sacking and shipping considerable high-grade ore. The recent strikes in the Gold Leaf carry with them a great deal of importance, as they are the first strikes of any consequence on the south slope of Carbonate Hill.

PILOT.—In this property, which is located on the California Gulch slope of Printer Boy Hill, a new strike of exceptional magnitude has been made by the lessees, including Messrs. F. X. O'Brien, Phil Golding, and Sport Goris. It was at a distance of 400 feet in the tunnel on this property and 175 feet from the surface that a winze was started. The object of this policy was to connect with an uprise that had been run from the Bradshaw, which was abandoned on account of water, when the lessees concluded to open the ground from above. They had sunk but fifteen feet, when they came upon a crevice of matter that is heavily impregnated with horn-silver. The vein is small, but there is every reason to believe that this is simply a streamer from a large body of mineral

SAN JUAN COUNTY.

The San Juan *Herald* contains a long description of a number of claims in Dry Gulch, about a mile and a half above Delmino. Carbonates of copper and galena carrying silver have been found.

The Stahl concentrator is pushed to completion as rapid as possible, and Professor Stahl intends having the mill in operation by the fifteenth of August. There are hundreds of tons of ore on the dump of the Sampson and other mines awaiting the starting of the mill.

Seven concentration-works will be running in the Upper Animas country by the 15th of August.

BEN FRANKLIN.—This mine is located about one mile up the right-hand Fork of Eureka Gulch, almost on a level piece of ground, and the open cut where the rich mineral was found is where the trail to the Sunnyside mine crosses it. Two years ago, Mr. Howard sold it to Messrs. W. E. Webb and W. A. Whiton for $1000. These parties did nothing with it, except patent it, until this spring, when they set a few men at work, making an open cut and shaft within a few feet of the creek. In sinking this shaft 14 feet, they took out nothing but solid lead ore, and at the depth of 13 feet they struck between three and four feet of rich antimonial silver and gray copper, from which assays ran from 500 to 2000 ounces in silver. Water beginning to come in rapidly, work had to be abandoned in the shaft. At this point, the mountain rises about one hundred feet at an angle of thirty-five degrees, and the croppings extend over this rise and show the lead ore on the surface. Men were set to work blasting and quarrying out the mineral on this side-hill. The mineral is known to be 30 feet wide, and how much wider is not known. Forty feet below the cut, the width of the mineral exposed is 75 feet. A cross-cut tunnel, now in 65 feet, is running to cut the vein at a depth of about 100 feet after running some thirty feet more.

HIGHLAND MARY.—The main tunnel has reached a depth of 2680 feet, being 2375 feet below the surface of Innes Mountain; and when the tunnel has been completed to the Bald Eagle fissure, it will be 3450 feet below the surface of the vein. The tunnel is now going ahead with unusual prosperity, and an average of 75 feet each week made with the Ingersoll drills. We were informed that about 2200 feet would have yet to be run before any remuneration could be expected from the mine, when they expect to cut the Bald Eagle lode.

NATIONAL BELLE.—The parties in negotiation for this property are Mackey, of Nevada, the silver king, and Senator Osbiston, who have a price of $300,000 now at their disposal. They will purchase the property on these conditions: First, to investigate the mine, and, if the price is suitable, they will take it upon conditions that they have ninety days to explore the same, keeping all the ore to defray the expenses of exploration. If they find the property to be worth dollar for dollar of $300,000, they will pay that; if not, they will make an offer for just what is in sight.

NORTH STAR.—The *Herald* says that the rumor that the North Star mine, on Sultan Mountain, had been sold for $450,000 is contradicted, and by reference to the recorder's office, we find a bond and trust deed has been given to Mr. Lucius B. Kendall, with a cash payment of $10,000 giving L. B. Kendall & Co. entire control of the mine. This will be somewhat of a surprise to those interested, as the North Star is considered worth at least one quarter of a million. We are informed that Mr. Kendall has purchased the mine for the purpose of proper development, and expects to expend $25,000 before any remuneration will be expected. Two big contracts will be let upon the North Star in the third and fourth levels, and the property otherwise developed in systematic shape for production. Mr. J. L. Lattin will be retained as manager and resident superintendent, and all work at the mine will be contract work.

SUMMIT COUNTY.

GOVERNOR.—The Governor Mining Company, on the Upper Blue, is putting up a building 40 by 75 feet, to put machinery in for concentration, which, when completed, will treat forty tons of crude ore per day. The machinery is ordered and will soon be on the ground. The mill ordered for the Governor is similar to that used by the Payrock Mining Company at Georgetown, which has proved a complete success in every particular on ore similar to that of the Governor group.

DAKOTA.

FATHER DE SMET.—The report of the superintendent, from July 14th to July 22d, shows ore extracted from the first, second, and third levels, 1900 tons. Ore milled 1900 tons. Golden Gate east cross-cut, third level, advanced 12 feet; commenced 5th July. The clean-up of the mine for the first half of July yielded $15,065.31.

IDAHO.

BANNER.—The Banner mill started up the other day with 15 stamps, and already several assays have been made. The assaying is better than ever before, running from 109 ounces to 113 ounces.

WOOD RIVER REGION.

MOUNTAIN BOY.—The Little Wood River Mining and Smelting Company has purchased the Mountain Boy mine for $10,000. The mine is situated at Muldoon, and is regarded as one which, if developed, will give large profits over all expenses.

NORTH STAR.—The ore-bodies are opening up so well that the superintendent has ordered concentrating-works, which will be delivered in two or three weeks. As he will have every thing else ready when the engine and jig arrive, it will not require over a week thereafter to start up the works.

STAR.—The Star group of mines, which is located in Star Gulch, about a mile and a half southwest of Hailey, has changed hands, the purchase price having been paid over last night. The figures are unknown, but variously stated at from $65,000 to $100,000. The sellers are David Falk and A. Wolters. Mr. Falk retains a fourth interest in the property. The purchasers are Moses Hirschman, Louis Martin, Emanuel Kahn (of Kahn Brothers), and J. W. Willard. All are Salt Lake parties. The Star was one of the earliest locations made in the Lower Wood River valley, and one of our first yielding mines. It has never been worked very steadily—probably not over eighteen months, all told—yet it has yielded to date some $85,000 worth of ore which averages probably as high as $175 per ton. The ore carries some sulphur and zinc, but that only means an additional cost of $7 to $10 per ton for smelting—an extra expense for which the high grade of the ore more than compensates.

MICHIGAN.

COPPER.

WILMOT.—The Wilmot Mining Company is the name of a new organization, on lands owned by Dr. Garlick and others, of Ohio, and O. N. Andrews, of this place, being the S. ½ of S. W. ¼ and S. W. ¼ of S. E. ¼ of Sec. 15, and N. ½ of N. ½ of Sec. 22, and N. W. ¼ of N. W. ¼ of Sec. 23, all in town 50, range 42. This is the tract where explorations were carried on last season, with a view of locating the Nonesuch vein in the slate belt. The land lies about five miles to the south and east of the Nonesuch mine, and two and a half miles southeast of the White Pine mine. Early this spring, Dr. Garlick sent up a steam oil-well drill under the superintendence of Mr. Stratton, which has been set up and found to work admirably. One hole has been put down 44 feet on to the conglomerate

belt, which lies under the slate belt in which lies the Nonesuch vein. The drill has been moved about 100 feet northwest, and will continue its work until the outcropping of the vein has been found, when a shaft will at once be sunk on it.

IRON.

The entire force, numbering 400 men, at the Republic mine, at Humboldt, went on strike on the 1st, for an advance of wages of 12½ cents. The president of the company told the men to confer with the executive committee at Cleveland. Much excitement but no disorder prevails.

MONTANA.

DEER LODGE COUNTY.

ALICE.—The *Miner* says that the Alice has for some time past been looked upon as the mine which would eventually solve the problem as to the depth of silver-bearing ledges in this camp, and especially on what is known as the Rainbow lode. The systematic methods of mining and extensive operations of this company have already developed the three veins of the Rainbow lode sufficiently to fully demonstrate their value and extent to a lower depth than has been reached in any other mine. The ledge, which has been stripped for a horizontal distance of nearly 400 feet on the 100 level, has also been developed on the 200 and tapped on the lower levels. The winze from the 700 has been sunk in ore the entire distance to the 800, at which point a cross-cut has been run to the north wall of the ledge and one is driving south. Thirty feet of vein-matter are now exposed in the cross-cut, and it is expected that the south wall will be reached in a distance of 30 feet farther. The ledge maintains the same general characteristics as in the upper levels, and further cross-cutting will undoubtedly develop the same sixty feet of vein-matter carrying the three veins of pay-ore so well known as the north, south, and center veins of the Rainbow lode. A west drift has been run 30 feet on the ledge from the bottom of the winze, and the drift has now two feet of good pay in the face, while the ledge maintains the general character developed above.

HOPE.—Prospecting with the diamond drill is successfully prosecuted in the Hope mine at Phillipsburg. In five weeks, 1100 feet have been drilled at an average cost of sixty cents per foot.

The Granite Mountain Company has ordered a diamond drill with which to prospect its valuable property. If the experiment proves satisfactory, several other drills will be used in the camp.

NEVADA.

Reports reach the Eureka *Sentinel*, through reliable sources from Osceola, that the Monroe & Linton mine, located at that place, has been sold to Charles Tozier, of San Francisco. The purchase price is not stated, but it is thought to be about $25,000. Machinery for a mill is on the road by way of Salt Lake. The mill will be located within a few hundred yards of the mine. If the mill proves a success, there is a bright future before Osceola.

A committee from the Carson mills visited all of the ranches along the river, there to find the most shameful waste of water. In some instances, the ranchers had turned the water on the sage-brush, and were letting it run to waste, simply to keep other ranchers from using it. In places, they found bodies of water ankle deep, covering hundreds of acres, and doing no good to any one. Some years ago, the United States Court gave the mills a perpetual injunction against the ranchers for the use of the water. Carson City is threatened with a water famine, and one man who illegally diverted the water has been sent to jail for 250 days and fined five hundred dollars. The law will be invoked against the ranchers to compel them to give the mills enough water to run their stamps.

COMSTOCK LODE.

The joint Union Consolidated and Sierra Nevada west cross-cut, on the 3000 level, says Tuesday's *Enterprise*, is still driving ahead. This cross-cut found the ore-vein cut on the 2900 level to be 30 feet in width on the 3000, whereas on the level above it had a width of but 11 feet. After passing through this thirty-foot vein, the cross-cut came to a streak of porphyry nine feet wide, and next found a vein of milling ore seven feet in width. West of this, porphyry again comes in, and the cross-cut had last evening been advanced into this about five feet. They will push ahead, as it is not unlikely that, after going a few feet farther in porphyry, they will again come to ore. It is some 500 feet to the west wall of the Comstock lode, and the ground into which they are now passing has a very kindly appearance. The seven-foot streak is something new. It did not show on the 2900 level. The 30-foot vein is undoubtedly the continuation of the 11-foot vein found on the level above. Even though nothing be found in going farther west, they may now start a drift south, the full width of which will be in milling ore. This new streak, and the formation into which they are now passing, look well for Sierra Nevada. There are indications that the ore will make north as well as south. There is also much of interest about the winze (down from the 2900 to the 3000 level) and in the east end of the cross-cut therefrom. This winze will, in a day or two, be continued toward the 3100 level, and it will start off in quartz. Before it is 50 feet in depth, it will cut into the fine streak of quartz (in all, some ten feet wide) which was claimed by many to be the vein cut above on the 2900 level. This is a different character of quartz from that of the eleven-foot vein above. It shows very little gold. Both this and the quartz streaks cut in the winze are essentially silver-bearing material, while the thirty-foot vein and the seven-foot vein run unusually high in gold. It is not unlikely that the porphyry separating all these streaks and veins will wedge out before the 3100 level is reached, thus forming a large ore-vein. However, supposing them to hold as at present, the cross-cut from the winze will have but a short distance to go on the 3100 level before it will reach the thirty-foot vein.

EUREKA DISTRICT.

ALBION.—Albion has been shipping ore daily for the last week to the Eureka Consolidated furnaces at the rate of 15 tons per day. Prospecting and ore extraction are carried on with a force of 20 tributers and men on day's pay. The mine shows considerable improvement generally. The tributers have good paying pitches, and the company's men are at work on good ore.

CHRISTIE.—The tailings at Mineral Hill owned by this company amount to 30,000 tons, an average of which taken for sample by R. D Clarke, superintendent of the Geddes & Bertrand, who has lately inspected the property, assays from $15 to $20 to the ton. The question is, how to reduce these tailings at a profit. They can be made to pay by the ordinary mill process now in use on the premises; but a cheaper way is looked for, by which the maximum can be saved and a big clean-up made. Mr. Clarke makes a safe estimate that a leaching-plant can be put up on the grounds at a cost of $25,000 that will reduce 40 tons per day and save $6 above all expenses per ton. The profit on the 30,000 tons at this rate, less $25,000 for leaching-works, would leave a net balance of $155,000. In addition to this, there are 15,000 or 20,000 tons of $25 and $30 ore on the dump near by, that could be reduced at a profit of $5 per ton by the same process. This ore then, taking the lowest figures, should net $75,000, which, added to the profit from reducing the tailings, $155,000, would swell the total profit to $230,000.

EUREKA CONSOLIDATED.—The drift from the new shaft is in 140 feet without any change of formation, continuing in black lime. The drift is still dry, no water having been encountered. At 80 feet, the drift entered a body of clay which gave some trouble, requiring very heavy timbers. The ground in the face is firmer, and does not swell. The progress in drifting is about 40 feet per week. The Eureka Consolidated mine has not changed in any noteworthy manner since the last report. Another, the second, furnace was started up on Friday. The two furnaces together reduce about 100 tons per day.

NEW MEXICO.

The smelter of the Colorado & New Mexico Mining and Smelting Company, located at Magdalen, Socorro County, New Mexico, and owned by Messrs. Kerr, White, Fairley, Clark, and Sinclair, has been blown in. It is treating the ores taken from the mines of this company, and from eight to ten tons of bullion are shipped daily.

The Rankin Smelter, at Copper City, yesterday shipped 7000 pounds of copper bullion to Bernalillo. It is the first shipment, and it shows conclusively what there is in the district.

PENNSYLVANIA.

A vein of iron ore has been found in Plum township, on the eastern border of Alleghany County, which is said to assay 60 per cent. Native ores ordinarily assay from 25 to 40 per cent. Some of those who have seen it say it is the best foundry ore found in this section. The vein is located three miles from Logan's Ferry, on the Alleghany Valley road, on the farm of Alexander McJunkin. The man who discovered it was formerly a puddler. Mr. McJunkin has been busily at work digging out the ore for some time past, and will soon send down to Pittsburg three car-loads, which will be used by some of the iron mills there. The vein has a regular thickness of eight feet, and is said to be solid.

UTAH.

CAVE.—The main working tunnel, starting in the western face of the mountain, a good distance up, yet not so far but that a good wagon-road has been made to it, has been driven in 700 feet. Here, a hundred yards beyond the old workings, a stained kind of a wall was struck, which was followed southward two hundred feet or so, when it began to change into ore; and while this new country has not been thoroughly explored as yet, there are estimated to be perhaps 12,000 tons of $30 (net) ore in sight. The general average of the ore in car-load lots is 50 lead, 26 silver, and half an ounce of gold, with perhaps 25 per cent iron, the lead being all carbonate and fluxing itself, making the iron in the ore available for fluxing dry ores. It is no longer delivered at Frisco; it is proposed to induce the railroad to extend a switch out near the mine from Milford, and send it, as also the ores of the Carbonate mine, to Sandy.

EMMA.—Work on the old Emma mine, Alta, is progressing finely. The shaft has reached a depth of 200 feet and is still going down. A cross-cut on the 135-foot level has penetrated 165 feet, and will soon tap an incline sunk by the present company some three years ago, at which time work was suspended on account of water. This cross-cut is in good ground, and has tapped the ledge 250 feet below the workings of the old Emma. Thirty men are employed on the property, and it is probable ore-shipping will begin within a few months.

MAMMOTH.—The Salt Lake *Tribune* says that the Mammoth property, Tintic, is in a fair way to be placed in working order soon. It will be remembered there has been trouble, which a few months ago caused the smelters and mines to shut down, since which they have remained idle. This trouble came mostly through the failure of the English parties who had taken hold of the property, and failed to make payments to employés and creditors. Mr. Goodhart came here from London a short time ago, as attorney for the English capitalists who had invested in the property, and made the McIntyre Brothers a proposition, which has been accepted, and which, on the payment of certain moneys next month, will place the property in the hands of the English purchasers. If they comply with their part of the contract, it is probable that within the next thirty or forty days the mine and smelters will be again put in operation.

ONTARIO.—The big tunnel for the Ontario mine will soon be completed and in full running order. This tunnel starts from a point below the mill, under which it runs, ninety feet below the batteries, and ends at shaft No. 3, where the big Cornish pump is located. The distance is 5742 feet, nearly all the way through hard rock. Work was begun in June, 1881, but the progress was slow the first year, as the work was all done by hand. Since introducing air drills, one year ago, the progress has been very rapid; in fact, the best speed at driving such tunnels that we know of has been made. An intermediate shaft 300 feet deep was used to expedite the work, and at one time there were four headings in progress at the same time. Since last March, the work has been pushed more rapidly than ever, and during the time 2900 feet were pierced. On the night of July 22d, connection was made between shaft No. 3 and the intermediate shaft, and nothing now remains to begin using the tunnel in draining the mine except to place a flume 2800 feet in the bottom, to complete the water channel. This will require about three weeks' time, and then the lift of water from the mine will be shortened 500 feet from what it is now. At present, the water is pumped from the eighth level to the union tunnel, 100 feet below the surface, while the new tunnel taps the shaft on the 600-foot level. The cost of hoisting water will be reduced to less than one third that of the old system, and this will gradually increase as the mine is sunk below the 800-foot level. A short time ago, there was an increase of water in the mine, and it rose some distance, but did not get up to the 600-foot level, as reported, by a long ways. Extracting ore goes steadily on from all the levels, and the property is looking as well as, if not better than, ever before.

STORMONT.—The superintendent's report, dated July 14th, shows that the mine and mill are running on full-time, and the shipment of the full quantity of ore required to mill. The strike on winze 15 is producing well, and also strike on winze 23; and during the week, about 75 tons of good ore were hoisted from the old Buckeye works. The total ore for the week sent to mill was 287 tons. On the 12th of July, work was begun on sinking the main incline to the sixth level. The vein on the incline is similar in appearance and quality of ore to that in the fifth level south. Assays, July 15th, showed as follows: 10 inches, $8.11 per ton; 12 inches, $116.84 per ton; 12 inches, $116.21 per ton. Gross bullion to July 1st, $114,307.95.

YOSEMITE.—This mine, at Bingham, is turning out its regular quota of ore, and is operated by a force of twenty men. In this mine, there is an immense body of ore, part of which is low-grade, requiring concentration. For this purpose, the company, some time ago, erected a concentrator, operated by a small steam-engine, and it does its work to the satisfaction of the owners. First-class ore is sent to the sampler without concentrating, and this amounts to about one half the product in tons, or 100 tons per month of first class ore and 100 tons concentrated. The process of concentrating is simple and not very expensive. Second-class ore as it comes from the mine is emptied from the cars by dumping on to a slanting screen. The finer portions pass through the screen and fall on one portion of the floor, while the lumps pass beyond. On this floor is the rock-breaker, and beneath it a feeding-apron. The ore in lumps is thrown into the crusher and the finer on the apron, and all is fed to the Cornish rolls below, so as to pass evenly through them, dropping into a spout which conducts into a revolving screen. In this spout the ore is caught and carried by a stream of water, which aids in washing away the lighter and useless portions, while the ore drops through screens and reaches the jiggers. There are three of these revolving screens set on an angle, so as to give a good fall from the crusher to the end of the last screen. Each screen has its jiggers to complete the work of concentration. The mill treats thirty or forty tons of crude ore per day, reducing three and five to one. The mine is operated by an incline, and has good hoisting-works, pumps, etc. George W. Crow is superintendent of the mine and mill. All the water used in concentrating ores is pumped from the mine, and the quantity is not great enough to keep the mill running more than about twelve days per month, which is ample at present to do the work for the quantity taken out. All the ore is hauled by teams to the sampling-works at Sandy.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 3.

The mining market this week has been very dull, and the transactions have been mostly confined to a few stocks. Of these, Consolidated Virginia, Robinson, Eastern Oregon, Sonora, and Alta-Montana take the lead. Prices have generally been steady, but there is no marked change either way to note. B low is given a full summary of the market The total number of sales aggregates 190,513 shares, as against 235,354 last week.

The Comstock shares have had a fair business at steady prices. California was active and strong, selling from 26@38c. Consolidated Virginia had a very active business and was also strong; it sold from 28@36c., assessment unpaid. Sierra Nevada was quiet and steady at $4@$4 15. Union Consolidated sold at $4.85. Mexican was dealt in to the extent of 300 shares at $3@$3.10. Hale & Norcross sold at $6. Sutro Tunnel was moderately dealt in at steady prices, selling from 19@20c.

The Leadville stocks were very quiet, and were steady. Amie sold from 15@14c., with a small business. Chrysolite was quiet and steady, selling from $1 15@$1.20. Dunkin sold at 52c. Iron Silver, with a business of 700 shares, sold at $3.05. Leadville sold at 51c.

The Bodie stocks were also very quiet at steady prices. Bodie sold at 70c., and Bulwer at 76c. Standard records a small business, and was strong, selling from $6.25@$6.13@$6 50.

The Tuscarora stocks were moderately dealt in, and were steady. Belle Isle sold at 43@40c., with a small business. Navajo was strong, selling from $3.10@$3.25. North Belle Isle sold at 35c. Independence was quiet and weak, declining from 50@43c. Elko Consolidated was moderately dealt in at irregular prices, selling from 19@14@15c.

In the miscellaneous list, Alice has been quiet and weak, selling from $2 50@$2.25. Bassick was a little weak at $10@$9.75. Eureka Consolidated has been strong under a small business, selling from $4.50@$5.50. Green Mountain was quiet and steady, selling from 75@77c. Horn-Silver records a moderate business, and was irregular, selling from $7.25@$8@$7.63. Hukill, with a small business, was quite weak, declining from 6@4c. Northern Belle sold from $7@$6.75, with small transactions. Robinson Consolidated was very actively dealt in at very irregular prices; it sold from 72@90c., then declined to 62c., closing to-day at 68c. Sierra Grande has had a small business at irregular prices, selling from 96c.@$1@95c. Stormont records a fair business, and has been steady, selling from 37@35c.

Alta-Montana, with a very active business, has been irregular, selling from 8@7@6c. Central Arizona was quiet and steady at 15c. Decatur sold at 4c. throughout the week; the transactions were small. Eastern Oregon was very actively dealt in at strong prices; it sold from 81@85c. Sonora Consolidated was active and irregular, selling from 28@24@26c. South Hite had a small business at weak prices, selling from 1@6@2c.

MEETINGS.

United States Bullion Refining Company, No. 56 Broadway, New York City. Special annual meeting for the election of trustees, August 8th, at twelve o'clock noon.

DIVIDENDS.

The Horn-Silver Mining Company, of Utah, has declared a quarterly dividend (No. 10) of $300,000, payable August 15th.

The Standard Consolidated Mining Company, of California, has declared its monthly dividend of twenty-five cents per share, payable August 13th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows on the petroleum market:

The principal factor in the market this week was the appearance of the monthly statement of development-work in the oil regions, which was far more bearish than expected. It showed 32 more wells drilling than thirty days ago, and 87 more rigs up and building than a month ago. Thus there are practically 119 more wells under way than on the 30th of June. Coupled with this was another bearish fact, namely, the increase in surplus of oil held in the custody of the Pipe Line companies of 404,461 barrels. Furthermore, Porcupine well No. 8 came in during the week, producing 800 barrels the first twenty-four hours, and now yielding at the rate of about 500 barrels daily. Several other wells came in as pretty fair producers, and there appears to be no scarcity of the crude product. Added to all this was the reduction of the price of refined oil ⅛c. per gallon. All these bearish influences served rather to prevent an advance than to cause a decline. The highest price, $1.09¾ was succeeded by $1.05¼ for the lowest, and at this writing prices are back to $1.08⅛. Opinion as to the future course of prices is about equally divided, and no radical change is likely to occur for some days, although the market is active.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 28	$1.08¾	$1.09¾	$1.06⅝	$1.06⅞	2,885,000
30	1.07	1.09	1.05⅞	1.08	3,432,000
31	1.07¾	1.09⅛	1.06⅜	1.06⅜	3,933,000
Aug. 1	1.06⅜	1.07½	1.05¼	1.06⅞	2,443,000
2.	1.06⅞	1.07½	1.06⅛	1.07	3,244,000
3	1.07⅜	1.08½	1.07¼	1.08⅛	2,492,000
Total sales					18,429,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. July 27.	July 28.	July 30.	July 31.	Aug. 1.	Aug. 2.
Albion						
Alpha						
Alta	.65	.65	.65			
Argenta						
Bechtel						
Belcher	.85	.85	.90			
Belle Isle	.35					
Best & Belcher	3¾	3⅞	3⅞			
Bodie	.65	.65	.65			
Bullion						
Bulwer						
California	.25	.25	25			
Challar	3½	3	3⅛			
Con. Virginia	.35	.30	.30			
Crown Point	.80	.80	.85			
Elko Cons	.25					
Eureka Cons	4¾	4⅞	6			
Exchequer						
Gould & Curry	2½	2⅝	2¾			
Grand Prize						
Hale & Norcross	6	6	6⅜			
Independence	.50					
Martin White		.20	.25			
Mexican	2¾	2¾	2⅞			
Mono						
Mount Diablo		5¾	5			
Navajo	3¼	3¼	3¼			
Northern Belle	7½		7			
North Belle Isle						
Ophir	2½	2⅝	2⅝			
Overman						
Potosi	1⅛	1⅛	1⅛			
Savage	2⅛	1⅞	2			
Scorpion						
Sierra Nevada	3⅝	3⅞	3⅞			
Silver King						
Tip-Top						
Union Cons	4¾	4¾	4¾			
Utah	2¼	2¼	2⅜			
Wales Cons						
Yellow Jacket	2¾	2¾	2⅞			

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 2.

Since our last report, the market for copper stocks, although ruling extremely dull and inactive, has shown a somewhat firmer tone, and prices, as a rule, are a shade higher. There is no change in the market for ingot copper, which is selling about 15⅛@15¼c. for Lake, and other grades proportionally lower; but the feeling seems to be quite prevalent that the bottom has been reached, and some parties are quietly picking up all the stray lots of the dividend-paying stocks that are offered, in the expectation that higher prices will prevail before the year closes. There is no speculative element in the market, and in consequence all the non-producing mines are inactive, with only a sale now and then of a hundred or two shares, as a reminder that they are still in existence. Calumet & Hecla continues to advance, and sales at $245@$246 are recorded. The stock is not abundant in the market, and only small lots come out even at the advance; in fact, only two shares have been sold the past week at $243, although $247 has been bid for it, and it is doubtful if much could be bought even at $250. Franklin has shown some considerable activity and firmness at about $10, with a 50-share lot sold at $10¼, buyer 60. The holders of this stock are not disposed to part with it at this price, to any extent, and have not lost all hope of a dividend some time during the ensuing fall. Quincy is now selling, ex dividend ($3 per share), at $45½, which is about $½ higher than the last sale, dividend on. There is not much stock offering, and holders are well satisfied with the present outlook at the mine. A sale of five shares of Atlantic at $12 is the only transaction for the past two weeks. Osceola is steady at $21, but not much doing in it. The sale of the delinquent stock of the Pewabic and Huron mining companies on which the assessments have not been paid was held last week. Of the Pewabic, about 1000 shares were sold, the price ranging from $2½@$3¼ per share. Of Huron, less than 2000 shares were disposed of at an average price of about $1¼ per share.

In the general market, Pewabic sold at $3¼, and Huron at $1½. Brunswick Antimony put in an appearance the past week with sales of small lots at $15@$16. The Douglass mine, of Maine, has levied an assessment of 25 cents per share, and the stock is offered in the market at 65 cents, assessment paid. This mine continues to look promising. The ore improves in the lower levels, and the production is about 1½ tons of ingot copper per day, and it is said that the company is fully paying its expenses. Should this mine prove a success, it will give a great impetus to mining interests in Maine

In silver stocks, there is but little doing. Silver Islet, which had its "spurt" up to $7½, has declined to $5, and is now offered at that, $4 being best bid. Sullivan declined to 62½c., and is now offered at same price, 50c. bid. Catalpa advanced to 52½c., but declined to 47½c., which is now bid. Harshaw sells at 50c., and parties stand ready to take all offered at that price, although there is said to be about 70 cents in the treasury to divide among the stockholders. Only 250 shares of Bonanza have been sold the past two weeks, at $1⅞@$2.

At the Mining Exchange, there is but little of interest. Sales of Bowman Silver at 16@20c., closing at latter price bid. Massachusetts & New Mexico has faded from the public view, selling under 5c. per share, and, according to a rule of the Exchange, is no longer quoted. Empire is dull at 15c. bid, 20c. asked. Considerable business is developing in railroad shares, Toledo, Cincinnati & St. Louis being most prominent.

3 P.M.—The market closes dull and lifeless. For Calumet & Hecla $247 is bid. Quincy sold at $45½, and same bid. Franklin, $10 bid. Pewabic, $3. Osceola, $21.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug 3.

Mr. Edward J. Shriver, Secretary of the Metal Exchange, has collected the following statistics for 41 furnaces, relating to stocks and production in July:

Grade.	Stocks. July 1.	Stocks. Aug. 1.	Production in July.
No. 1	1,714 tons.	1,833 tons.	5,635 tons.
No. 2	4,505 "	4,968 "	2,582 "
Forge	5,868 "	5,807 "	8,612 "
Not specified	2,147 "	2,550 "	1,777 "
Total	14,234	15,158	18,606

These figures do not indicate that there has been any particular cause for improvement.

American Pig.—The market has been very quiet during the past week, and though there has been no change in prices and some grades are very firmly held, we find that it has lost rather than gained in strength. The supply of No. 2 is ample. We continue to quote $22@$23.50 for standard to choice No. 1, ordinary brands being obtainable at a concession of 50 cents; $19.50 $20.50 for ordinary to choice No. 2; and $18@$20 for inferior to choice Gray Forge. Bessemer Pig is dull at $20.50@$21 at tidewater, London cabling unchanged, 50@51s. for Nos. 1 to 3. Spiegeleisen is dull at $31@$32 for 20 per cent. The arrivals of English metal of high grade in quantity are pressing upon the market. Our American furnaces are now succeeding in maintaining a high grade over long periods regularly, but, of course, are unable to supply more than a small part of the demand.

At the Metal Exchange, the following transactions in pig-iron have been recorded thus far this week: Tuesday, 100 tons, No. 1, October delivery, at $21¾. Wednesday, 400 tons, No. 1, November, at $21⅞, and 300 tons, November, at $22. Thursday, 200 tons No. 1, October, at $21¾, 300 tons No. 1, October, at $22, and 100 tons, October, at $21⅞; and to-day 300 tons, November, at $21¾, 100 tons, November, at $21⅞, 100 tons, November, at $22, 300 tons, October, at $21⅞, and 100 tons, October, at $21¾.

Scotch Pig.—There has been an advance in

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.		
1	Alice, S. C.	Mont	$10,000,000	400,000	$25	*				$400,000	Dec.	1881	.10
2	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*				305,000	May	1880	.10
3	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	220,000	Feb.	1883	$2.00
4	Argenta, S.	Nev.	10,000,000	100,000	100	275,000	Jun.	1883	.25	40,000	Feb.	1880	.20
5	Barbee & Walker, S.	Utah	1,000,000	100,000	10	*				60,000	Nov	1880	.10
6	Bassick, G. S.	Colo.	10,000,000	100,000	10)	*				200,000	Jun.	1883	1.00
7	Belle Isle, S.	Nev..	10,000,000	100,000	100	85,000	May	1883	.20	300,000	Dec.	1879	.25
8	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,588,000	Apl	1883	.25	15,397,000	Apl.	1876	1.00
9	Birdseye, G.	Cal..		15,000							Dec.	1882	
10	Black Bear, G.	Cal..	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20
11	Bodie Con., G.	Cal..	10,000,000	100,000	100	175,000	Mch	1883	.50	1,295,000	Nov	1882	.20
12	Bonanza Developm't	C & M	3,000,000	300,000	10					135,000	Oct..	1882	.15
13	Boston & Mont, G.	Mont	2,000,000	200,000	10	*				310,000	Jan.	1883	.05
14	Breece, S.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01
15	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	165,000	July	1883	.15
16	California, G. S.	Nev..	54,000,0 0	540,000	100	854,000	Jun.	1883	.20	31,320,000	Dec.	1879	.50
17	Calumet & Hecla, C.	Mich	2,500,000	100,000	25					23,850,000	July	1883	5.00
18	Carbonate Hill, S. L.	Colo.								60,000	July	1883	.05
19	Caribou Con., S.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10
20	Carolina Queen, C.	N. C..	200,000	100,000	2					8,000	Oct.	1882	.02
21	Castle Creek, G.	Idah.	100,000	100,000	1					42,000	July	1883	.03
22	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*				240,000	Jun.	1883	.10
23	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00
24	Christy, S.	Utah	6,000,000	60,000	100					90,000	Jan.	1883	.10
25	Chrysollte, S. L.	Colo.	10,000,000	200,000	50	*				1 600,000	Dec.	1881	.50
26	Con. Gold Mining, G.	Ga..	500,000	100,000	5	*				1 8,000	July	1883	.04
27	Con. Virginia, G. S.	Nev..	54,000,0 0	540,000	100	897,000	Aug	1882	.30	42,930,000	Aug.	1880	.50
28	Contention, S.	Ariz.	12,500,000	250,0 0	50					22,461,500	Jun.	1883	.25
29	Copper Queen, C.	Ariz.	2,500,000	250,000	10					1,100,000	July	1883	.50
30	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00
31	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25	*				4900,000	Jan.	1883	.10
32	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				200,000	July	1881	07½
33	Eureka Con., G. S. L.	Nev..	5,000,000	50,000	100	200,000	May	1883	1.00	4,767,500	July	1882	.25
34	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,250,000	July	1883	.50
35	Excelsior, G.	Cal..	10,000,000	100,000	100	300,000	Jan.	1882	1.00	875,000	Oct..	1880	.25
36	Father de Smet, G.	Dak..	10,000,000	100,000	100					610,000	July	1883	.20
37	Findley												
38	Franklin, C.	Mich		54,000		360,000	Jun	1877		243,000			
39	Freeland, S.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.25
40	Fresno Enterprise, G.	Cal..	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10
41	Gem, S.	Colo.	125,000	125,000	1					29,750	May	1883	.02
42	Glass-Pendery, S. L.	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10
43	Glen, S.	Colo.	100,000	100,000	1					7 000	May	1883	.01
44	Gold Stripe												
45	Gould & Curry, G. S.	Nev..	19,800,000	108,000	100	3,530,000	Jun.	1883	.50	3,826,000	Oct.	1870	10 00
46	Grand Central, S.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25
47	Grand Prize, S.	Nev..	10,000,000	100,000	100	470,000	Jun.	1883	.25	450,000	Sept	1880	.25
48	Granite, S.	Colo.	125,000	125,000	1					6,250	May	1883	.01
49	Great Eastern, G.	Dak..	300,000	300,000	1	*				16,000	July	1880	.01
50	Great Western, Q.	Cal..	5,000,000	50,000	100	35,500	Aug	1873	.15	262,500	Oct..	1882	.25
51	Green Mountain, G.	Cal..	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½
52	Hale & Norcross, G. S	Nev..	11,200,000	112,000	100	4,062,000	Jun.	1883	50	1,598,000	Apl	1871	5.00
53	Hall-Anderson, G.	N. S.	150,000	150,000	1					2,000	Jan.	1882	.05
54	Hecla Con., S.	Mont	1,500,000	30,000	50					462,500	July	1883	50
55	Henriett, L.	Colo.		270,000						27,000	Feb.	1883	.10
56	Hibernia, S. L.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40
57	Holyoke, G.	Idah.	200,000	200,000	1					32,000	Jun.	1883	.02
58	Homestake, G.	Dak..	12,500,000	125,000	100	200,000	July	1878	1.00	1,212,500	July	1883	.40
59	Hope, S.	Mont	400,000	8,000	50	*				103,124	July	1883	1.50
60	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				2,800,000	Aug.	1883	.75
61	Hukill, G. S.	Colo.	1,000,000	200,0 0	5	*				210,000	Dec.	1878	.10
62	Idaho, G.	Cal..	310,000	3,100	100					3,372,250	Jun.	1883	2.50
63	Independence, S.	Nev..	1 ,000,000	100,000	100	245,000	May	1883	.30	225,000	Sept	1879	.25
64	Indian Queen, S.	Nev..	250,000	125,000	2					368,750	July	1883	03
65	Inyo, G.	Cal..	500,000	100,000	5	*				45,000	Apl.	1882	.05
66	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*				1,100,000	Jun.	1883	.20
67	Jocuistita, S.	Mex.	10,000,000	100,000	100					850,000	May.	1883	.50
68	Kentuck	Nev..	3,000, 00	30,000	100	342,000	Nov	1881	.30	1,261,000	Jun.	1883	.10
69	La Plata, S. L.	Colo.	2,000,000	200,00	10	*				610,000	Sept	1882	.30
70	Leadville, S. L.	Colo.	4,0 0,000	400,000	10	*				200,000	May	1883	.05
71	Leeds, S.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15
72	Little Chief, S. L.	Colo	10,000,0	2 0,000	50	*				700,000	Aug.	1880	.50
73	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch	1880	.50
74	Marguerite, G.	Cal..	500, 00	25,000	20					18.750	Oct..	1882	.25
75	Martin White, S.	Nev .	10,000,00	100,000	100	1,000,000	Jun.	1883	.25	90,000	July	1879	.30
76	Minas Nuevas, S.	Mex.	300,000	100,0 0	3	*				20,000	July	1883	.10
77	Morning Star, S. L.	Colo.	1,000,000	100,000	10	F.				500,000	July	1883	25
78	Napa, Q.	Cal..	700,000	100,000	7					240,000	Jan.	1883	.10
79	Navajo, G. S.	Nev..	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25
80	New York Hill, G.	Cal..	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10
81	New York & Colo., G.	Colo.	1,25 ,000	50,0 0	25					25,000	July	1879	.10
82	Northern Belle, S.	Nev.	5,0 0,000	50,000	100					2,400,000	Apl.	1883	.50
83	North Bell Isle, S.	Nev..	10,000,000	100,000	100	95,000	May	1883	.20	30,000	Aug.	1881	.15
84	Ontario, S. L.	Utah	15,000,000	150,000	100					4,925,000	Jan.	1883	.50
85	Ophir, G. S.	Nev..	10,000,000	100,000	100	3,545,000	Apl.	1883	.50	1,595,000	July	1882	1.00
86	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	860,000	July	1883	50
87	Oxford, G.	N. S.	100,000	100,000	1	*				20,000	Jun.	1883	.05
88	Pleasant Valley, G. S.	Cal..	10,000,000	100,000	100	15,000	May	1883	.15	30,000	Dec.	1882	.05
89	Polonia, S.	Colo.	200,000	8,000	25					12,000		1882	1.50
90	Prussian, S. L.	Colo	1,500,000	150,000	10					132,000	Jan	1883	.10
91	Quick-liver, pref., Q.	Cal..	4,3 0,000	43,000	100					654,000	July	1882	6.00
92	" com., Q	Cal..	5,700,000	57,000	100					151,000	July	1882	.40
93	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,584,000	July	1883	3.50
94	Renfrew, G.	N. S.	60,000	30,000	2					4,80	July	1882	.02
95	Richmond, S. L.	Nev..	1,350,000	54,000	25	*				3,975,087	May	1883	1.25
96	Rising Sun, S.	Dak..	750,000	150,000	5	*				52,000	May	1881	.07½
97	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03
98	Robinson Con, S. L.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50
99	Robert E Lee, S. L.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10
100	San Francisco, C.	Cal..		50,000						25,000	Jan.	1883	.05
101	Savage, S.	Nev..	14,20 ,000	142,0 0	100	5,540,000	July	1883	.50	4,460,000	July	1869	3.00
102	Shasbas, G.	Idah.	150,000	150,000	1					7,500	Apl.	1883	.01
103	Sierra Buttes, G.	Cal..	225,000	22,500	10					1,435,308	Apl.	1883	.25
104	Sierra Grande, S.	N. M.	10,000,000	400,000	25					600,000	Apl.	1883	.25
105	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	5,250,000	Mch	1883	1.00	102,000	Jan.	1871	1.00
106	S'a P'nas Eureka, G	Cal..		40,6 5							Apl.	1882	
107	Silver King, S.	Ariz.	1,000,000	100,000	100					1,275,000	Jun.	1883	.25
108	Silver King, S.	Colo.	1,000,000	500,000	2					50,000	Aug.	1881	.10
109	Smuggler, S. L.	Colo.	600,000	6 ,000	10					27,900	Mch	1883	.10
110	Socorro, C.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾
111	Spring Valley, G.	Cal..	2 0,000	200,000	1	*				50,000	Jan.	1881	.25
112	Standard, G. S.	Cal..	10 000,00	100,0 0	100					4,200,000	Aug.	1883	.25
113	Stormont, S.	Utah	200,0 0	200,0 0	1	*				155,000	Nov	1881	.05
114	St. Joseph, L.	Mont	1,0 0,00	100,000	10	*				590,000	Dec.	1882	.20
115	Tip Top, S.	Ariz.	10,000,000	100,0 0	100	220,000	May	1883	.25	100,00	Nov	1881	.20
116	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*				1,250,000	Apl	1882	.10
117	True Fissure, G. S. L.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15
118	United Gregory, G.	Colo	3 0,000	300,000	1					38,250	Apl.	1883	.25
119	United Gold Min. Co.	Colo.									Oct..	1883	.05
120	Vizina, S.	Ariz.	5,000,000	200,000	25	*				140,000	Apl	1882	.10
121	Yellow Jacket, G. S.	Nev..	12,000,000	12 ,000	100	5,358,000	Feb.	1882	1.00	2,184,000	Aug.	1871	1.50
122	Yuba, G.	Cal..	5,000,000	200,000	25					4,000	Sept	1881	1.00

	Highest and Lowest Prices per Share at which Sales were Made. July 28. H.	L.	July 30. H.	L.	July 31. H.	L.	August 1. H.	L.	August 2. H.	L.	August 3. H.	L.	Sales.	§
1	2.50	....	....	....	2.25	....	....	....	....	....	....	....	300	....
2	....	....	....	....	....	....	.14	....	.15	.14	.14	....	2,200	....
3	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
6	....	....	....	....	9.75	....	....	....	10.00	....	9.75	....	110	....
7	.43	.40	....	....	....	....	.42	.40	....	....	....	....	900	....
8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F
10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
11	....	....	....	....	.70	....	....	....	....	....	....	....	200	S.F.
12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
13	....	....	....	....	....	....	....	....	....	....	....	....	....	....
14	....	....	....	....	....	....	....	....	....	....	....	....	....	P.
15	....	....	....	....	....	....	.76	....	....	....	....	....	100	....
16	....	....	.30	.26	.27	....	.32	.27	.31	.29	.38	.35	8,325	B.
17	....	....	....	....	....	....	....	....	....	....	....	....	....	....
18	....	....	....	....	....	....	....	....	....	....	....	....	....	....
19	....	....	....	....	....	....	....	....	....	....	....	....	....	....
20	....	....	....	....	....	....	....	....	....	....	....	....	....	....
21	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
22	....	....	....	....	....	....	....	....	....	....	....	....	....	....
23	....	....	....	....	....	....	....	....	....	....	....	....	....	....
24	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
25	....	....	1.15	....	....	....	....	....	1.20	....	1.20	....	2,200	....
26	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
27	.32	.31	.30	.28	.29	.28	.33	.28	.32	.30	.36	.33	17,645	....
28	....	....	....	....	....	....	....	....	....	....	....	....	....	....
29	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
30	....	....	....	....	....	....	....	....	....	....	....	....	....	....
31	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
32	....	....	....	....	.22	....	....	....	....	....	....	....	400	....
33	4.75	4.50	....	....	5.00	....	5.25	....	....	....	5.50	....	373	S.F
34	....	....	....	....	....	....	....	....	....	....	....	....	....	....
35	....	....	....	....	....	....	....	....	....	....	....	....	....	....
36	....	....	....	....	3 70	....	....	....	....	....	....	....	100	....
37	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38	....	....	....	....	....	....	....	....	....	....	....	....	....	....
39	....	....	....	....	....	....	....	....	....	....	....	....	....	....
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....
41	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
42	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
43	....	....	....	....	....	....	....	....	....	....	....	....	....	....
44	....	....	....	....	....	....	....	....	....	....	....	....	....	....
45	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
46	....	....	....	....	....	....	....	....	....	....	....	....	....	....
47	....	....	....	....	....	....	....	....	....	....	....	....	....	....
48	....	....	....	....	....	....	....	....	....	....	....	....	....	....
49	....	....	....	....	.01	....	.01	....	....	....	....	....	6,500	....
50	....	....	....	....	....	....	....	....	....	....	....	....	....	....
51	.76	....	.75	....	....	....	....	....	.77	.75	....	....	1,700	....
52	....	....	....	....	....	....	6.00	....	....	....	....	....	100	....
53	....	....	....	....	....	....	....	....	....	....	....	....	....	....
54	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F
55	....	....	....	....	....	....	....	....	....	....	....	....	....	B
56	....	....	....	....	....	....	....	....	....	....	....	....	....	....
57	....	....	....	....	....	....	....	....	....	....	....	....	....	....
58	....	....	....	....	17.25	....	....	....	....	....	17.00	....	40	....
59	....	....	....	....	....	....	....	....	....	....	....	....	....	....
60	7 38	....	....	....	7.50	7.25	8.00	7.75	....	....	7.75	7.50	2,050	....
61	....	....	.06	....	06	....	....	....	04	....	.04	....	2,700	....
62	....	....	....	....	....	....	....	....	....	....	....	....	....	....
63	.50	....	....	....	.43	....	....	....	....	....	....	....	900	....
64	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
65	....	....	....	....	....	....	....	....	....	....	....	....	....	....
66	3.05	....	....	....	....	....	3.05	....	....	....	3.05	....	700	S.F.
67	....	....	....	....	....	....	....	....	....	....	....	....	....	....
68	....	....	....	....	....	....	....	....	....	....	....	....	....	....
69	....	....	....	....	....	....	....	....	....	....	....	....	....	E..
70	....	....	....	....	....	....	.51	....	....	....	....	....	200	....
71	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
72	....	....	....	....	....	....	....	....	....	....	....	....	....	....
73	....	....	....	....	....	....	....	....	....	....	....	....	....	....
74	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
75	....	....	.30	....	....	....	....	....	....	....	....	....	200	B.
76	....	....	....	....	....	....	....	....	....	....	....	....	....	....
77	....	....	....	....	....	....	....	....	....	....	....	....	....	....
78	....	....	....	....	....	....	....	....	....	....	....	....	....	....
79	....	....	3.10	....	3.15	....	3.25	3.15	....	....	....	....	1,350	....
80	....	....	....	....	....	....	....	....	....	....	....	....	....	....
81	....	....	....	....	....	....	....	....	....	....	....	....	....	....
82	....	....	7.00	....	....	....	....	....	....	....	6.75	....	150	B.
83	....	....	....	....	....	....	....	....	.35	....	.35	....	200	....
84	....	....	....	....	....	....	....	....	....	....	30.00	....	50	....
85	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
86	....	....	....	....	....	....	....	....	....	....	....	....	....	....
87	....	....	....	....	....	....	....	....	....	....	....	....	....	....
88	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
89	....	....	....	....	....	....	....	....	....	....	....	....	....	....
90	....	....	....	....	....	....	....	....	....	....	....	....	....	....
91	....	....	....	....	....	....	....	....	....	....	....	....	....	P.
92	....	....	....	....	....	....	....	....	....	....	....	....	....	....
93	....	....	....	....	....	....	....	....	....	....	....	....	....	S.F.
94	....	....	....	....	....	....	....	....	....	....	....	....	....	....
95	....	....	....	....	....	....	....	....	....	....	....	....	....	E..
96	....	....	....	....	....	....	....	....	....	....	....	....	....	....
97	....	....	....	....	....	....	....	....	....	....	....	....	....	....
98	.75	.73	.90	.75	.83	.80	.75	.70	.69	.66	.70	.62	45,500	....
99	....	....	....	....	....	....	....	....	....	....	....	....	....	E.
100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
101	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
102	....	....	....	....	....	....	....	....	....	....	....	....	....	....
103	....	....	....	....	....	....	....	....	....	....	....	....	....	E.
104	.98	.96	1.00	.98	1.00	....	.97	....	.97	....	.96	.94	4,800	....
105	....	....	....	....	4.00	....	4.15	....	....	....	....	....	200	P.
106	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
107	....	....	....	....	....	....	7.50	....	....	....	....	....	50	S.F.
108	....	....	....	....	....	....	....	....	....	....	....	....	....	....
109	....	....	....	....	....	....	....	....	....	....	....	....	....	....
110	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
111	....	....	....	....	....	....	....	....	....	....	....	....	....	....
112	6.50	6 25	....	....	6 13	....	....	....	6.50	....	....	....	920	....
113	.37	36	.37	....	.37	.36	.36	....	.36	....	.35	....	7,200	....
114	....	....	....	....	....	....	....	....	....	....	....	....	....	....
115	....	....	....	....	....	....	....	....	.75	....	....	....	100	....
116	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
117	....	....	....	....	....	....	....	....	....	....	....	....	....	....
118	....	....	....	....	....	....	....	....	....	....	....	....	....	....
119	....	....	....	....	....	....	....	....	....	....	....	....	....	E.
120	....	....	....	....	....	....	....	....	....	....	....	....	....	B.
121	....	....	....	....	....	....	....	....	....	....	....	....	....	....
122	....	....	....	....	....	....	....	....	....	....	....	....	....	....

* Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡ Tais company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British mines. Dividend shares sold, 108,402.

freights, which are now quoted by cable 9@10s. from Glasgow to this city, which induces importers to assume a firmer attitude, though business is not large, and arrivals continue light. We quote ex ship: Coltness, $23.75@$24; Langloan, $23.75@$24; Summerlee, $23@$23.50; Dalmellington, $21@$21.50; and Eglinton, $21.

At the Exchange, the following lower cable quotations were received: Coltness, 60s.; Langloan, 60s.; Summerlee, 56s. 9d.; Gartsherrie, 57s.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 48s. 3d. Warrants to-day were 47s. 6d.

Rails.—Business is restricted to small parcels for early delivery, which can not be placed at much lower figures than $38.25@$38.50, the latter being the basis for a 1500-ton lot recently sold. There is very little doing in winter delivery, chiefly because makers insist on $38 at mill, which buyers consider too high.

Old Rails.—There has been a little more inquiry, but sales are very moderate at the range of $21.50 @$22.50 for Ts at tide-water.

Scrap Iron.—At the Exchange, a sale of 500 tons of scrap, August shipment, was recorded at $23, which we quote nominally.

Philadelphia. Aug. 2.

Pig-Iron.—Local transactions have been, for the most part, of a trifling character, to enable consumers

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. July 28. H.	July 28. L.	July 30. H.	July 30. L.	July 31. H.	July 31. L.	August 1. H.	August 1. L.	August 2. H.	August 2. L.	August 3. H.	August 3. L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50														S. F.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50														S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,137,290	July	1883	.25														S. F.
6	Alta-Montana, G.S.L.	Montana	5,000,000	500,000	10					.07	.06	.08	.06	.08	.06	.06	.05	.05	....	.06	....	16,850	.....
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														.....
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*																	.....
9	Battle Creek																						.....
10	Bear Creek	California	300,000	300,000	1																		.....
11	Beaucc																						.....
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Best & Belcher, G. S.	Nevada	10,080,000	100,800	100	1,396,190	May	1883	.50														S. F.
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	.....
15	Black Jack, G.	California	250,000	100,000	2½																		.....
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	.....
17	Bonanza King, G. S.	California	1,000,000	10,000	100	*																	.....
18	Bondholder	Colorado	500,000	200,000	2½				.25														.....
19	Boston Con., G.	California	10,000,000	100,000	100	95,000	October	1882															.....
20	Boulder Con.	Colorado																					.....
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																		.....
22	Buckeye	Colorado	2,000,000	400,000	5	*																	.....
23	" preferred	Colorado																					.....
24	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	.....
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,767,000	May	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	.....
27	Calaveras, G.	California	500,000	500,000	1	*																	.....
28	Cal. W'r & M. Co, G.	California																					.....
29	Caledonia, S. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15														.....
30	Catskill, S.	Nevada	1,500,000	30,000	5																		.....
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					.15		.15								.15	....	800	B.
32	Chapparal	California																					.....
33	Cherokee, G.	California	1,500,000	150,000	10																		.....
34	Chollar, S.	Nevada	11,200,000	112,000	100	521,000	March	1883	.50														S. F.
35	Climax																						.....
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																		.....
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																		.....
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05														.....
39	Con. Pacific, G.	California	6,000,000	60,000	100	150,000	March	1883	.15														.....
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																	B.
41	Crowell, G.	North Car.	500,000	500,000	1																		.....
42	Dahlonega, G.	Georgia	250,000	250,000	1	*																	.....
43	Dardanelles, G.	California	1,000,000	100,000	10																		.....
44	Decatur									.04		.04		.04		.04		.04				3,700	.....
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																	.....
46	Durango, G.	Colorado	500,000	500,000	1	*																	.....
47	Eastern Oregon																						.....
48	Elko Con., S.	Nevada					April	1883	.15														B.
49	Empire, S.	Utah	10,000,000	100,000	100																		.....
50	Enterprise	Colorado																					.....
51	Exchequer	Nevada	10,000,000	100,000	100	650,000	June	1883	.20														.....
52	Fannie Barret, S.	Colorado																					.....
53	Globe Copper	Arizona																					.....
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																	.....
55	Goodshaw, G.	California	10,000,000	100,000	100	210,000	June	1883	.10														.....
56	Granville, G.	North Car.	300,000	300,000	1	*																	.....
57	Harlem M. & M. Co, G.	California								1.30												800	B
58	Harshaw, S.	Arizona	10,000,000	100,000	100																		.....
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														.....
60	Hortense, S.	Colorado	2,000,000	20,000	10																		.....
61	Julia, G. S.	Nevada	11,000,000	110,000	100	1,405,000	April	1883	.10														.....
62	Kossuth, G. S.	Nevada	10,800,000	108,000	100	424,200	August	1877	.15														.....
63	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																	.....
64	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														.....
65	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	.....
66	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															.....
67	" common, G.	California	100,000	100,000	100	1,975,100	February	1881	.25														.....
68	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														.....
69	Mayflower, S.	Colorado	10,000,000	100,000	100	*																	.....
70	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,319,400	July	1883	.50							3.10	3.00					300	S. F.
71	Michoacan Synd.	Mexico																					.....
72	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	.....
73	Miller	Nevada	5,000,000	200,000	25																		.....
74	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20														S. F.
75	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	.....
76	Moulton, G. S.	Montana	10,000,000	400,000	25	*																	.....
77	Nevada Syndicate																						.....
78	North Standard, G.	California	10,000,000	100,000	100	20,000	November	1881	.10														.....
79	North Horn-Sil., S. L.	Utah		400,000																			.....
80	Nonday	California	600,000	60,000	10	208,000	December	1882	1.00														S. F.
81	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																	.....
82	Oriental	Nevada	2,000,000	200,000	10																		.....
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25					.14		.14										2,200	.....
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,604,700	May	1882	.25														S. F.
85	Parnell																						S. F.
86	Potosi	Nevada	10,200,000	112,000	100	556,640	May	1883	.25														.....
87	Quartz Creek				100																		.....
88	Rappahannock, G.	Virginia		250,000		*						.08										200	.....
89	Red Elephant, S.	Colorado	500,000	500,000	1	*						.06								.07	....	2,500	.....
90	Retort M. & M. Co.	Colorado			10																		.....
91	San Pedro, G. S. L.	New Mex.		400,000																			.....
92	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*														12.	....	600	B., P.
93	Silver Islet	Canada	1,000,000	40,000	25																		.....
94	Sonora Con.	Mexico								.27		.28	.26	.27		.27		.26	.24	.26	.24	16,200	.....
95	South Bodie, G.	California		100,000		100,000	March	1882	.15														.....
96	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25														.....
97	South Hite	California	10,000,000	100,000	100		January	1883	.05	.03	.01	.02		.04	.03	.06	.05			.02		6,200	.....
98	South Pacific	California			5																		B.
99	State Line, No. 1, S.	Nevada	200,000	200,000	1																		.....
100	" No. 2, S.	Nevada	5,000,000	200,000	25																		.....
101	" No. 3, S.	Nevada	5,000,000	200,000	25																		.....
102	" No. 4, S.	Nevada	5,000,000	200,000	25																		.....
103	" Nos. 1 and 4, S.	Nevada			25																		.....
104	" Nos. 2 and 3, S.	Nevada																		.03	....	1,000	.....
105	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														.....
106	Sutro Tunnel	Nevada		2,000,000		*				.20	.19	.20		.20	.19	.20				.20	....	7,200	B.
107	Taylor-Plumas	California			10																		B., P.
108	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10														.....
109	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														.....
110	Unadilla, S.	Colorado	50,000,000	500,000	100	*								.02								1,000	.....
111	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,670,000	July	1883	.50					4.85	....	4.85	....					200	.....
112	Utah, S.	Nevada	2,000,000	20,000	100	1,420,000	July	1883	1.00														S. F.
113	Vandewater	Nevada	20,000,000	200,000	100	*																	.....
114	Washington	Arizona	2,000,000	200,000	10																		.....
115	Whalen Copper	Nevada	2,500,000	100,000	25																		.....
116	Wide West																						.....
117	Willshire	California	250,000	50,000	5	*																	.....

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 82,050. Total shares sold, 190,513.

to carry themselves over the summer season. Neither quotations nor actual selling prices have changed Concessions are of rare occurrence. No new factors have appeared. A good deal of difference of opinion is expressed as to the shape trade will take during the latter part of this month and next. The leading companies are indifferent as to the course of demand, and are satisfied that the actual requirements will protect their interests against the low prices that some buyers talk about. The best makes of special Foundry iron still command $23.50, and prices range from that all the way down to $21.50, as usual. The most of this week's business was done between $22 and $22.50, and it seems probable that these figures will be maintained, as makers are putting forth no efforts to attract buyers. It is announced that some few furnace companies will resume in September; but this is uncertain as yet, as fall demand can not be accurately predicted. No. 2 iron commands $19.50@$21. Quite a number of small sales are recorded at $20@$20.50. The output during the past few weeks has not been up to the average. In Gray Forge iron, some few inquiries for 1000-ton lots have been made, and purchases have been partly arranged for. The surplus of anthracite iron is sufficient to protect buyers' interests. At present prices, there is very little room for further decline, and no temptation to increase the

supply. The mill-men hold back, and makers and brokers are not trying to push stocks on the market. The average business is done quietly, and both sides are waiting for something new. More or less inquiry is made for Bessemer iron, but transactions are unimportant. Buyers name $20. During the past week, some fresh inquiry has been developed for spiegeleisen. Sales foot up between 5000 and 6000 tons at $30.25 for 20 per cent.

Manufactured Iron.—Western competition is beginning to be felt in offerings at 2·10c., and hence buyers predict a drop in Eastern prices. The market is easy, and the consumptive requirements seem to be presented in a regular and even way, and are easily met by manufacturers. Selling prices average 2·20c., but large lots can not be moved at this price. Fall buying is expected to be done at 2·15c. Retail lots move easily at 2·25c.

Skelp Iron.—Sales are heard of, on private terms. A good deal of common iron has been bought at country mills. The lowest transactions known of are 1·90c.; highest, 2·10c.

Plate Iron.—This week's business has been similar to others. Sales run from 50 to 500-ton lots. A fair amount of business has been done. Where large orders are concerned, present quoted prices have been shaded. Prospective requirements are heavy.

Structural Shapes.—A fair business has been done, and prices are quoted firm.

Sheet-Iron.—Transactions are increasing in volume for fall requirements, and prices for large lots are perceptibly firmer, especially where prompt delivery is insisted upon. Galvanized iron is 40 per cent off; demand fair.

Steel Rails.—Small lots are chiefly called for, at $38.50. Winter deliveries are held at $38; buyers offer $37, at which figure negotiations are now in hand.

Old Rails.—No sales have been effected. Quotations are nominal.

Scrap is dull at $23@$25.

Pittsburg. Aug. 2.

The sensation here this week is the failure of L. B. Ward & Co., of Niles, O. It was brought about by the Graff, Bennett & Co., the Stone, and the Brown, Bunnell & Co. failures. The assets are trifling, and the liabilities are half a million dollars.

The iron market is healthier than it has been for months. The chief underlying causes are the facts that prices have reached the lowest possible limit; that production has been restricted; that stocks are low in consumers' hands; and that the future requirements of consumers are now presented. Prices are firmer but not higher. Offers made a month ago are now withdrawn. Inquiries are in hand for lots of iron from 100 to 1000 tons. The blowing out of so many furnaces is working good results. Quotations range from $16.50 for Mottled; $17@$17.50 for Gray Forge; $19@$20 for Foundry; Extra Forge, $18; Extra Foundry, $21; Bessemer Pig, $21, cash; Muck Bars, nominally $34. No sales.

BULLION MARKET.

NEW YORK, Friday Evening, August 3.

The market is firmer abroad to-day on a higher rate for exchange on India, but not quotably higher. An advance in sterling exchange here has slightly improved the rate here.

DATE	London. Pence.	N. Y. Cents.	DATE	London. Pence.	N. Y. Cents.
July 28	50 7-16	110⅛	Aug. 1	50 7-16	110⅛
30	50 7-16	110⅛	2	50 7-16	110⅛
31	50 7-16	110⅛	3	50 7-16@½	110¼

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 3d, as compiled from various sources, amounted to $194,000, as against $228,500 reported for the previous week. The receipts from January 1st, 1883, to date are $6,717,974.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discounts, and it remains at 4 per cent. During the week, the bank gained £350,000 bullion; but the proportion of its reserve to its liabilities was raised only ⅛ per cent—from 44¼ to 44⅜ per cent, against 36¾ per cent a year ago. August 2d, the bank gained an additional £112,000 bullion on balance. The weekly statement of the Bank of France shows losses of 4,025,000 francs in gold and 1,300,000 francs in silver.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended July 28th	$177,675
Corresponding week last year	1,729,428
Since January 1st, 1883	7,537,034
Corresponding period last year	40,571,188

Imports.

Week ended July 28th	$223,946
Corresponding week last year	13,093
Since January 1st, 1883	7,554,236
Corresponding period last year	2,095,777

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of June.	Year from Jan. 1st, 1883
*Alice, G. S.	Mont.	$72,913	$471,323
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal.	18,945	119. 35
Bodie Tunnel, G.	"	3,105	54,642
*Bonanza King, G.	"	67...75	334,223
*Boston & Montana, G.	Mont.	.....	72,318
*Central Arizona, S.	Ariz.	.....	35,845
*Christy, S.	Utah.	27,935	146,671
*Chrysolite, S. L.	Colo.	$54,705	246,676
Consolidated Bobtail	Colo.	.....	18,723
*Contention, S.	Ariz.	81,594	557,428
Crescent, G.	Cal.	.....	13,000
*Custer, G. S.	Idaho.	.....	43,572
*Deadwood-Terra, G.	Dak.	.....	172,277
*Derbec Blue Gravel, G. S.	Cal.	10,420	55,148
Evening Star, S. L.	Colo.	.....	47,061
*Father de Smet, G.	Dak.	25,038	178,163
*Frisco M. and S. Co., G. S. L.	Utah.	.....	$77,084
Gunnell, S.	Colo.	.....	58,828
*Head Center Consolidated	Ariz.	18,392	26,502
*Head Center and Tranquillity	Ariz.	18,019	60,620
*Hecla Consolidated, G. S.	Mont.	.....	293,922
*Homestake, G.	Dak.	.....	419,148
*Hope, S.	Mont.	.....	41,963
Horn-Silver, S. L.	Utah.	264,000	1,547,000
Idaho, G.	Cal.	.....	88,642
*Independence, G. S.	Nev.	.....	32,991
Iron Silver, S. L.	Colo.	.....	503,831
*Jocuistita, S.	Mex.	.....	‡228,022
*Kentuck, G. S.	Nev.	2,484	12,876
*Lexington, S.	Mont.	107,655	638,488
*Little Pittsburg, S. L.	Colo.	7,451	35,645
*Marguerite, G.	Cal.	6,998	45,745
*Martin White, G. S.	Nev.	.....	136,317
Morning Star, S. D.	Colo.	.....	84,428
*Moulton, G. S.	Mont.	.....	123,288
Mount Diablo	Nev.	60,512	187,823
*Navajo, G. S.	"	67,679	411,642
*North Belle Isle	"	200	2,153
Northern Belle, S.	"	7,381	395,906
*Ontario, S. L.	Utah.	87,652	1,038,687
*Oxford, G.	N. S.	7,076	35,255
*Phœnix, G.	S. C.	2,500	7,700
*Pinal Consolidated, S. L.	Ariz.	31,492	181,485
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont.	.....	101,241
Standard, G.	Cal.	133,026	575,822
Star, S.	Nev.	.....	27,095
*Stormont, S.	Utah.	18,651	114,308
Syndicate, G.	Cal.	9,043	29,116
Tintic M. and M. Co.	Utah.	6,969	14,601
*Tip Top, S.	Ariz.	4,876	‡27,858
*Tombstone, G. S.	"	91,400	414,230
Wyoming Consolidated.	Cal.	.....	31,541
Yellow Jacket, S.	Nev.	10,594	193,658
Total amount of shipments to date			

* Official. † Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, August 3.

Copper.—The market is quiet. There is little demand for Lake, and very little of this class of copper is offering, the range being about 15@15⅛c. Other brands of copper show more strength, and there is a disposition on the part of those who handle them to hold out for higher prices. We touch on some of the features affecting the future editorially. London cables lower, £63 10s. for Chili Bars and £69 17s. for Best Selected.

Tin.—This metal has been moderately active, the spot stock, which probably does not aggregate more than 1000 tons, being firmly held by strong parties, so that it is a difficult matter to get round lots of spot Straits or Malacca, which we quote 21⅛@21⅝c. Australian is easier. By cable, the shipments for the period of July 15th to 31st, from Singapore are advised as 230 tons to the United States, and 200 tons to Great Britain. London cables to-day £94 10s.

Lead.—The situation in this metal has not changed materially. Sales are on a jobbing scale exclusively, and while Common is freely offered at 4·30c., bids do not go higher than 4·25c., at which holders decline to sell as yet.

Messrs. John Wahl, of St. Louis, wire us as follows, to-day:

Our market is dull. Soft lead is freely offered at 4·05c. Sales for the week sum up over 300 tons of Refined at 4·03c. The best bid obtainable now is 4c. Hard Lead is quoted nominally at the same figure.

Messrs. Everett & Post, of Chicago, send us the following dispatch:

The market continues very dull, with no buyers. Business consequently has been very quiet and of a limited character. Prices are nominally 4·10c. for both Common and Refined.

Spelter.—This metal continues dull, with values ranging nominally between 4⅝@4⅝c. for good Western.

Antimony.—This metal is quiet, with quotations at 9¼@9⅝c. for Hallett's and 10¼@10⅝c. for Cookson's.

COAL TRADE REVIEW.

NEW YORK, Friday, Aug. 3.

Coal summarizes the situation as follows:

The trade continues with but few signs of encouragement. Current business is small in volume and is forced, notably on steam sizes, while middle-men are still engaged in placing the heavy amounts ordered by them in June, a work which is rendered more difficult because they have not the plausible argument of a nominal advance by the companies to fall back upon. One of them which is noted for taking good care of its contractors, will, as rumor has it, announce an advance in two weeks. So far as the others are concerned, they seem to have discussed the matter, arriving at the wise conclusion to let prices alone. Notice of a general advance of 10 cents a ton in the tolls on coal shipped both by rail and canal was given by the Philadelphia & Reading Railroad Company, to take effect August 1st. The new circular announcing the line and city and harbor prices of coal has been issued by the Philadelphia & Reading Coal and Iron Company. There is no change in the line and city prices, but the harbor prices embody the 10 cents advance in tolls, and are as follows: $4 30 for lump, steamboat, broken, and egg; $4.40 for chestnut; $4.55 for stove; and $2.55 for pea. These rates are for white-ash coal, and they are 25 cents higher on stove and chestnut, and 15 cents lower on pea than they were one year ago. Lump, steamboat, broken, and egg are unchanged from the prices of last August.

There is a good deal of speculation as to the probable quantity of coal which the market will be expected to take this year. On the 1st of July, the increase of this year over last was roughly 1,450,000 tons, in spite of the fact that there have been 51 idle days. This is usually interpreted as showing how much more active consumption has been, while it should really be read as showing how much the productive capacity has increased, probably partially under pressure. A large share of this increase has gone to Western distributing points, which are now full to overflowing, so that Buffalo is now beginning to stock to some extent. As yet, the work of distribution of this great quantity of coal has not fairly commenced, and the trade will look with anxious interest to the time when the good work is fairly started. The movement Westward must, however, soon abate to some extent, and the tidewater markets will receive greater quantities, which must be kept moving. With full time and with a moderate line trade only, it is feared that there will be some accumulation here, and this is what consumers are looking and holding off for. A heavy domestic consumption later on may easily dispose of this coal, but until the middle or end of August not much business of this character can be looked forward to. The manufacturing industries are dull, and bituminous coal is very cheap, so that the trade for steam sizes is very quiet.

Such is the situation as it is now. Should the future prove a disappointment, which we sincerely trust that it will not, only one of two things is possible, either prices can not be maintained or production will have to be curtailed again. It is, therefore, a little too early to figure out the output, because it is possible that there may be more coal than is wanted. It will all be needed if domestic consumption is heavy; but this is a factor which is always uncertain to some extent.

At the meeting of the Western Association at Saratoga last week, prices were let alone. The chief topic of discussion was the adjustment of railroad freights to a number of inland competitive points upon which uniformity was aimed at. These points involve a great deal of detail, and are difficult to settle satisfactorily to all parties concerned.

Bituminous.

The trade is as dull as ever, with no new features worthy of note.

Horsford's Acid Phosphate

In Liver and Kidney Troubles.

Dr. O. G. CILLEY, Boston, says: "I have used it with the most remarkable success in dyspepsia and derangement of the liver and kidneys."

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DIVIDENDS.

HORN-SILVER MINING COMPANY, Office, 44 Wall Street,

NEW YORK, July 31, 1883.

DIVIDEND NO. 10.

QUARTERLY DIVIDEND of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of August next, at the office of the company. Transfer-books will close on August 8th, and reopen August 16th.

W. S. HOYT, Secretary.